Clayoquot Sound

Sustainable Development Strategy

FIRST DRAFT

OF THE STRATEGY DOCUMENT

THE CLAYOQUOT SOUND

SUSTAINABLE DEVELOPMENT STRATEGY

STEERING COMMITTEE

January 1, 1992

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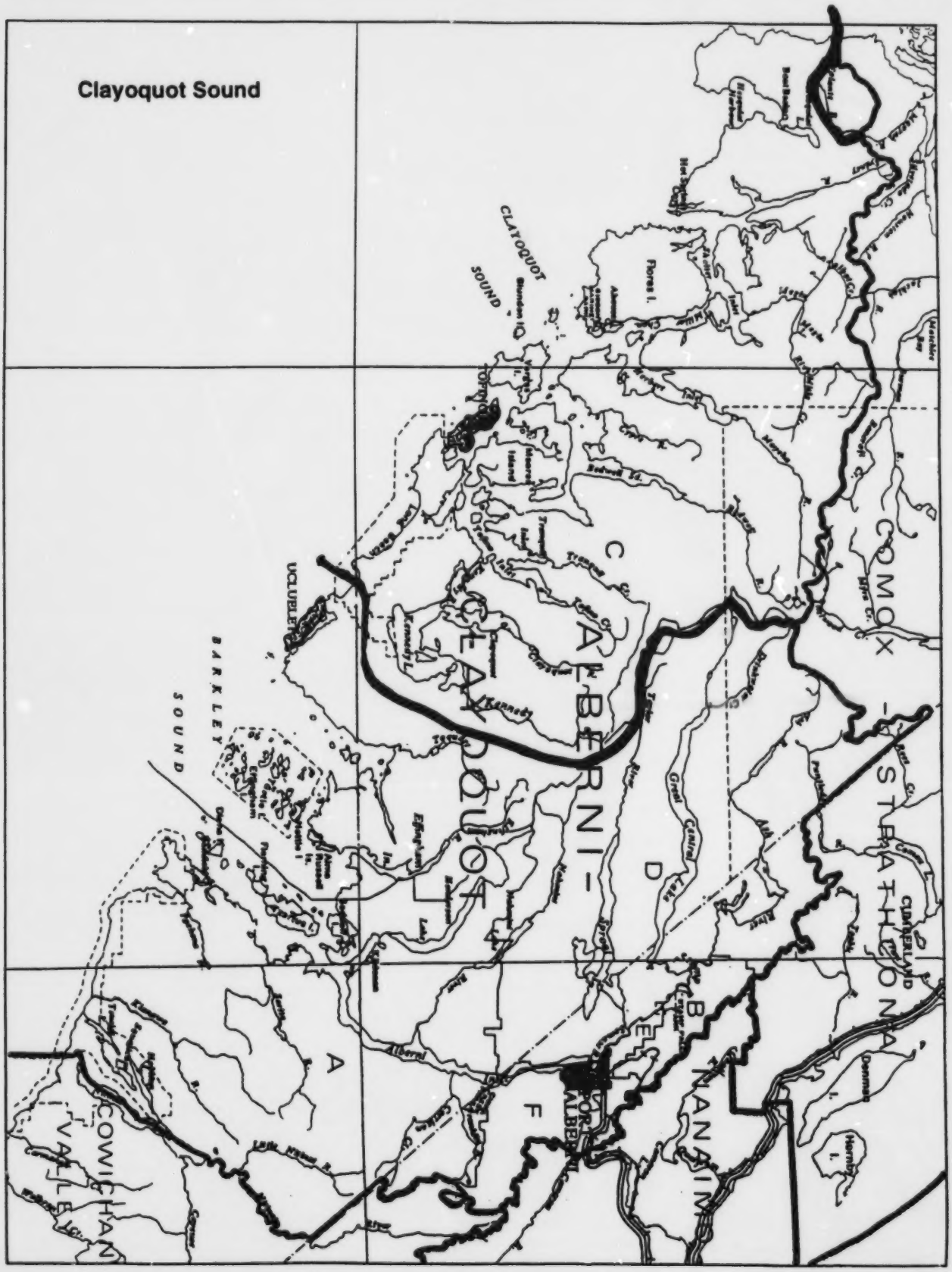
Clayoquot Sound
CLAYOQUOT SOUND
Flores I.
Meares I.
Vancouver I.
Tofino
Opitsaht
Hesquiat
Hesquiat Pen.
Hesquiat Harbour
Escalante Pt.
Estevan Pt.
Nootka I.
Nootka Sound
Esperanza Inlet
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Queen Charlotte Is.
Dixon Entrance
Ucluelet
Ucluelet Inlet
Barkley Sound
Effingham Inlet
Kennedy L.
Great Central L.
Alberni Inlet
Port Alberni
Cameron L.
Cumberland
Courtenay
Comox
Campbell River
Quadra I.
Sonora I.
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1. INTRODUCTION

This is the first draft of the Clayoquot Sound Sustainable Development Strategy. It has been prepared by the Steering Committee and the Strategy Director for review by the "public"— the people in the communities, interest groups, and governments that the Steering Committee represents.

The Steering Committee offers this draft as a discussion document. It has made it public at this stage to give as many people as possible a chance to make a constructive contribution to its further development.

The Steering Committee

The Steering Committee is a partnership of communities, interest groups, and provincial and federal governments. It is chaired by Mr Jim Walker and consists of representatives of:

Communities

Nuu-chah-nulth Tribal Council; City of Port Alberni; District of Tofino; Village of Ucluelet; Regional District of Alberni-Clayoquot.

Interest groups

Aquaculture; Fishing; Labour; Mining; Small Business; International Forest Products (Interfor)[1]; MacMillan Bloedel; Timber (small business); Tourism.

Governments

BC Ministry of Agriculture, Fisheries and Food; BC Ministry of Energy, Mines and Petroleum Resources; BC Ministry of Environment, Lands and Parks; BC Ministry of Forests; BC Ministry of Economic Development, Small Business and Trade; BC Ministry of Tourism; Canada Department of Fisheries and Oceans.

Canadian Parks Service is an observer.

Initially, Environment was also an interest group on the Steering Committee. Four months into the process, the environmental representatives withdrew from the Steering Committee, with unanimous support from the five main environmental groups they represented. The trigger for their withdrawal was the government decision to allow road building and logging in locations within the study area deemed critical to the integrity of Clayoquot Sound. In the view of the environmental representatives, this decision indicated the government's lack of commitment to this process, and undermined the agreed-upon

1. This seat was the responsibility of Fletcher Challenge Canada until 31 December 1991.

principles of the sustainable development strategy. Their letter of resignation is included in Appendix 8 of this document.

The Steering Committee is responsible for overall direction of strategy preparation, and for ensuring the full participation of the communities and main interest groups with a stake in the Clayoquot Sound area. Port Alberni, Tofino, Ucluelet and Alberni-Clayoquot have community advisory groups to encourage and facilitate consultation and consensus building within their communities and to ensure that their representatives speak for the full range of interests within their community.

Similarly, the interest groups have been formed to enable a wide range of resource users and other stakeholders to participate in developing the strategy.

The Strategy process

The purpose of the process is for people with a stake in the area to develop a strategy that will achieve sustainable development in Clayoquot Sound. The aim is to reach agreement on a final document that will set out:

- What parts of Clayoquot Sound should be designated for particular purposes.
- How resource uses in Clayoquot Sound should be managed.
- How to improve the economy of Clayoquot Sound and dependent areas in ways that are ecologically sustainable.
- How to maintain heritage values, natural diversity, and environmental quality.
- How to implement the Strategy.

The final document will be negotiated and agreed to by members of the Steering Committee. Once the Strategy has been adopted, the Provincial Government will endorse it on the basis of its full involvement in the process. The Government will then implement the Strategy with the other partners.

Whatever is agreed must have the understanding and support of the communities, interest groups, and governments they represent. Therefore, the people who live in the communities or who belong to the interest groups concerned must have an opportunity to express their views on the issues and options.

The Steering Committee has released this draft to provide this opportunity. The draft describes the issues and options on which we must reach agreement. But members of the Steering Committee do not necessarily agree with every point. In fact there may be several points that they don't agree with. It is also possible that we have overlooked some issues or options. We would like everybody to realize that this is a completely open process. In many instances we may be just "thinking aloud". We would like people to think aloud with us.

The schedule

We are allowing eight weeks for review of the first draft: from January 15 to March 11, 1992. The Steering Committee, interest groups and community advisory groups will continue work on the strategy document during this period. We would like to complete the second draft by April 30. The second draft should be close to the final document, and we would expect all members of the Steering Committee to agree with virtually all of it. We plan to give the public an opportunity to comment on the second draft during the month of May. We hope to reach agreement on the final document by the end of June.

What you can do

Please read this draft and send any comments by March 11 to:

Robert Prescott-Allen
Clayoquot Sound Strategy Secretariat
229 - 560 Johnson Street
Victoria, BC
V8W 3C6

Phone: 356-5017 or 474-1904
Fax: 356-9276 or 474-6976

You can also give your comments (preferably in writing) to your community or interest group representative. Names, addresses and phone numbers are listed at the end of this document. You could also get involved in the work of your community advisory group or interest group.

During the review period, panels of Steering Committee members will hold public meetings in each of the participating communities, to give you an opportunity to discuss the Strategy with them in person. The meetings will be announced in the media.

How the rest of this document is organized

The rest of this document is organized as follows. Chapter 2 sets the scene, briefly describing Clayoquot Sound. Chapter 3 provides a Nuu-chah-nulth perspective.

Chapter 4 sets out the principles of sustainable development, adopted by the Steering Committee as part of its terms of reference. Chapter 5 proposes a set of goals to put these principles into practice. Chapters 6 through 10 propose actions to achieve these goals.

Chapter 6 covers conservation of natural diversity. Chapters 7 through 10 cover the main industries: timber; fisheries and aquaculture; tourism; and mining.

Chapter 11 outlines an implementation plan. At this stage, it is sketchy.

An inventory of resources and values in Clayoquot Sound will be published under separate cover. The inventory will be arranged by groups of watersheds, to help us make decisions about what parts of Clayoquot Sound should be designated for particular purposes. In due course the inventory will be mapped.

2. CLAYOQUOT SOUND: THE PLACE, THE PEOPLE AND THE ECONOMY

The place

Clayoquot Sound is an array of islands, fjords, narrows, estuaries, mudflats, rocky shores, sand beaches, mountains, forests, lakes, streams and ocean on the west coast of Vancouver Island. Roughly 350,000 hectares in size (see Box 1), the area includes Hesquiat Peninsula, Esowista Peninsula, and the islands, sea, and all lands and waters draining into the Pacific Ocean from the height of land between Escalante Point in the north and Quisitis Point in the south (see Map).

The area is one of the most spectacular parts of coastal British Columbia, a region renowned for its beauty. It supports a wide range of resources and other values: a huge volume of old-growth timber; significant concentrations of metallic (gold, copper, zinc, etc.) and industrial (limestone, sand, gravel) minerals; fisheries that are important for local lifestyles and economy; magnificent scenic resources for tourism; and an unusual combination of marine, freshwater and land ecosystems. As demand for these resources and values increases, more and more thoughtfulness, skill and cooperation are required to sustain them and enable them to coexist with each other.

Clayoquot Sound lies on a complex mixture of volcanic and sedimentary rocks. The rocks of the Estevan Coastal Plain (roughly Hesquiat Peninsula, Vargas Island and Esowista Peninsula) are relatively recent (under 200 million years old). East of the plain they are up to 360 million years old. The older rocks are cut by intrusions of granitic rock. In places, the heat and pressure of these intrusions converted some of the surrounding area to metamorphic rock. Most of the known mineral concentrations in Clayoquot Sound are associated with these granitic intrusions or with past volcanic activity.

Clayoquot is one of five sounds on the west coast of Vancouver Island — two in the Alberni-Clayoquot Regional District (Clayoquot and Barkley) and the rest to the north (Quatsino, Kyuquot, and Nootka). It is unique among these sounds due to the number of narrow passages with fast tidal currents (such as Hayden Passage between Flores and Obstruction Islands) and the large extent of mudflats and shallow banks.

The narrow passages are rich in marine species, including species rarely found elsewhere in BC. The roughly 860 hectares of eelgrass beds associated with the mudflats and shallow banks form probably the largest cover of eelgrass along the west coast of Vancouver Island[1].

The mudflats and estuaries near Tofino are important internationally. They are one of nine coastal wetlands in BC identified as critical for waterfowl and shorebirds migrating along the Pacific flyway; and the only one on the west coast of Vancouver Island. With well over

1. Natural Environment study: 53 & 57.

Box 1. How big is Clayoquot Sound?

Estimates of the area of Clayoquot Sound and the forest land base are contradictory. The data in this box are rough and may be wrong. Better estimates are being made for the Strategy.

	HECTARES	-%-	% OF TOTAL LAND
Total area (approximate)	350,000	100	
Total water (lakes & sea)[1]	81,683	23	
Total land (except lakes)[2]	268,317	77	
Total land[2,3]	268,317	100	100
Indian Reserves[4]	1,055	<1	<1
District of Tofino[5]	1,941	1	1
Protected areas[6]	39,081	15	15
Alpine/rock/snow/ice[2]	15,795	6	6
Forest land[7]	209,289	78	78
Total forest land[7]	209,289	100	78
Non-"productive forest land"[8]	60,194	29	22
"Productive forest land"[7,8]	149,095	71	56
"Productive forest land" - total[7]	149,095	100	56
"Productive forest" - mature[7]	126,451	85	47
"Productive forest" - immature[7]	19,860	13	7
NSR/DSD[9] forest area[7]	2,784	2	1

Notes:

1. Estimated by subtracting total land from total area.
2. From BC Ministry of Forests, Remote Sensing Section (1991).
3. The items under "total land" do not add because they come from different sources.
4. From Ference 1987, cited by Nuu-chah-nulth Interests study.
5. From *Statistics relating to regional and municipal governments in British Columbia:* 1990.
6. Protected areas = 6,921 ha of Long Beach Unit of Pacific Rim National Park Reserve (7,690 ha minus the area south of Quisitis Point, estimated to be 10% or 769 ha) + 31,920 ha of Strathcona Provincial Park (Moyeha, upper Bedwell and upper Megin drainage basins) + Gibson Marine and Maquinna Provincial Parks (179 ha) + Cleland Island, Megin River and Sutton Pass Ecological Reserves (61 ha).
7. Timber study.
8. "Productive forest land" is land that is available for growing an economic crop of timber. It excludes protected areas, "environmentally sensitive areas", areas not considered economic to log at present, inaccessible areas, and roads.
9. NSR = Not satisfactorily restocked. DSD = Disturbed, stocking doubtful.

100,000 birds using the area, it is probably second in importance only to the Fraser River wetlands[2].

Most of the land area of Clayoquot Sound is covered by very wet Coastal Western Hemlock forests, characterized by western hemlock, western red cedar, yellow-cedar, amabilis fir (balsam), salal, Alaskan blueberry, deer fern, lanky moss and step moss[3]. At higher elevations, they are replaced by Mountain Hemlock forests and parkland, and, still higher, by Alpine Tundra (see also Chapter 6).

These forests are part of the North American temperate rain forest, which flanks the mountainous coast from Kodiak Island, Alaska, south to the Oregon-California border[4]. Here, land and sea strongly influence each other. Oceanic rain and fog promote the luxuriant growth of temperate rain forests on the land, which in turn provide nutrients for the waters of the coast and continental shelf.

The coastal forests arose some 7,000 years ago, as the climate warmed after the last great ice age. The rain forests and coastal habitats we know today developed later — about 5,000 years ago — when the sea level stabilized following the melting of the ice sheets, the numbers of salmon migrating up and down the coastal rivers increased, and cedar became an important component of forests that until then had been dominated by Douglas-fir[5].

In coastal Washington and Oregon most of the forest outside parks has been modified by logging. Only a few areas of any size have been left in their natural state. But in BC and Alaska large tracts of old-growth remain, in much the same condition as when they first developed about 5,000 years ago. Clayoquot Sound includes one of these tracts.

Nine of its primary watersheds (a primary watershed is a drainage basin that drains directly to the sea) of 1,000 hectares or more are essentially natural: logging, mining and similar activities have affected less than 2% of their area (see Chapter 6). Six of them (the Megin, Moyeha, Watta, Sydney, Ice and Cecilia) together form the largest continuous block of unmodified primary watersheds on Vancouver Island. Clayoquot Sound is the only area on Vancouver Island that combines large areas of old-growth forest and a diversity of coastal habitats.

The people and the economy

Administratively, socially and economically, Clayoquot Sound is part of the Regional District of Alberni-Clayoquot. Four communities live in Clayoquot Sound: the Nuu-chah-nulth bands of Ahousaht, Tla-o-qui-aht, and Hesquiaht; and non-Natives, virtually all of whom live in the District of Tofino. To the south are the neighbouring communities of the Ucluelet area, including the Ucluelet and Toquaht bands, and the Village of Ucluelet. To

2. Natural Environment study: 24 & 25.
3. Pojar, Klinka & Demarchi 1991.
4. Franklin 1988; Proctor & others 1980.
5. Woodcock 1990.

the east are the communities of Alberni Valley, including the City of Port Alberni. In 1986, the population of the Regional District was about 30,300 (see Box 2). About 1,800 (Tofino and much of Area C) were residents of Clayoquot Sound.

The economy of Alberni-Clayoquot depends heavily on natural resources: timber, tourism, fisheries, and aquaculture. Mining was once significant and may become so again in the future. Box 3 shows the relative importance of these resource sectors (including processing) in Clayoquot Sound and the Alberni-Clayoquot Regional District. The data are incomplete, cover different years, and have been arrived at by different methods. The economic impact of tourism has not been properly assessed, so a range of estimates is quoted. Data on the

Box 2. Population of Alberni-Clayoquot (1986)

		Indian reserves	Total
Alberni valley			
Port Alberni	18,241	—	18,241
Other (areas B,D,E,F)	7,475	418	7,893
Total	25,716	418	26,134
Tofino	940	—	940
Ucluelet	1,512	—	1,512
Area C*	381	953	1,334
Area A			
Bamfield	295	—	295
Indian reserves	—	126	126
Total	295	126	421
TOTAL	28,844	1,497	30,341

* Area C includes Clayoquot Sound outside the District of Tofino and the Ucluelet area outside the Village of Ucluelet.

Source: BC Ministry of Municipal Affairs, Recreation and Culture 1990

contributions of seafood production (fishing, aquaculture, and processing) are weak. In short, the information reveals only a rough ball-park picture.

For Tofino and the Nuu-chah-nulth bands of Clayoquot Sound, the most important sectors are tourism and seafood production. For the Regional District as a whole, timber is the most important sector, followed by tourism. Relatively few residents of Clayoquot Sound work in the timber industry. But the timber resources of Clayoquot Sound support a third of the jobs and dollars in the timber industry in the Regional District.

The natural features and resources of Clayoquot Sound are strongly valued for different

Box 3. Relative importance of resource sectors in Alberni-Clayoquot Regional District and Clayoquot Sound

	Alberni-Clayquot —$million—			Contrribution of Clayoquot Sound Resources to Alberni-Clayquot —$million—			Clayquot Sound —$million—		
	gross value[1]	labour income[2]	jobs FTE[3]	gross value[1]	labour income[2]	jobs FTE[3]	gross value[4]	labour income[2]	jobs FTE[3]
Timber 1989/91[5]	486.8	185.6	4272	162.3	61.9	1404[6]	?	0.9[7]	22[7]
Tourism 1988[8]	—	—	—	—	—	—	14.2	?	249
Tourism 1989[9]	176.8	52.1	2736	—	—	—	—	—	—
Tourism 1990[10]	51.8	21.8	1140	37.6	15.1	788	37.6	?	?
Fisheries 1990[11]	35.3[12]	?	424[13]	15.5[14]	?	?	15.5[14]	5.2	148
Aquacult. 1990[15]	?	?	?	?	?	?	11.1	2.3	120
Seafood p.1990[16]	?	>5.0	?	?	?	?	?	1.0	75
Mining 1989[17]	?	?	?	3.8	?	?	?	?	?

Notes:

1. Only part of the gross value is retained in the region.
2. Wages and salaries before tax, direct employment.
3. Jobs = direct employment, full time equivalent (FTE).
4. Only part of the gross value is retained in Clayoquot Sound.
5. Based on 1989 data from Simons (1990), adjusted for closure of the Port Alberni plywood mill, and converted to 1991 dollars. Source: Timber study.
6. Includes people who work in pulp and paper mills (480) and wood processing (376) as well as those who work in the woods (548).
7. Estimate based on woods related direct income from small business timber sales in Clayoquot Sound. It is assumed that the number of people in the timber industry who live in Clayoquot Sound is roughly equal to the size of the small business timber sector in Clayoquot Sound. Most people in the industry who live in Clayoquot Sound work in this sector. Some people who live outside Clayoquot Sound also work in this sector. It is assumed the two cancel each other out.
8. Source: Careless (1988).
9. Source: Novacorp (1990).
10. Source: draft Tourism study.
11. Source: Fisheries & Aquaculture study.
12. Landed value of area 23 and 24 fisheries.
13. Does not include shellfish harvesters outside Clayoquot Sound.
14. Landed value of area 24 fisheries.
15. Aquaculture. Source: Fisheries & Aquaculture study.
16. Seafood processing. Source: Fisheries & Aquaculture study.
17. Source: Mining study.

reasons by different people. The waters, lands and wildlife of Clayoquot Sound provide the Nuu-chah-nulth communities, whose ancestors first settled the area, with food, resources, income, culture, history, and future economic options (see Chapter 3 for the Nuu-chah-nulth perspective). Individuals who earn their living in the aquaculture, fishing, mining, timber, or tourism industries regard Clayoquot Sound as an essential part of their resource base. In Tofino, which relies largely on tourism, fishing, and aquaculture, the emphasis is on scenic and marine resources. In Ucluelet and Alberni Valley, the emphasis is on timber supply and, to a lesser extent, resources for tourism and fisheries.

Many people value all or particular parts of Clayoquot Sound for personal, non-financial reasons. Meares Island, all of Clayoquot Sound, Chesterman Beach, Megin River, Hot Springs, and Tonquin Park were each cited by more than 10% of Tofino residents as being of special importance to them. Kennedy River/Lake and Meares Island were cited by more than 10% of Ucluelet area residents as being of special importance to them[6].

The similarities and differences in the economies of each of the communities in the region are reflected in similarities and differences in values and attitudes about resource development and the environment[7].

Economic concerns are strong in all three communities. Concerns about unemployment and economic uncertainty are sharper in Alberni and Ucluelet, where a higher proportion of residents work in the timber industry. They have most to lose from the continued shrinking of the industry and feel most threatened by anything that may limit it further, whether market forces, economic efficiency, or land use conflicts. There is widespread agreement on the need for economic diversity, suggesting that all industries must somehow coexist for the region to prosper in a difficult economic world.

Most people in the region share the same environmental values. They are committed to sustainable use of all renewable resources, although they may differ on what is required for sustainability. More than four-fifths of the residents of all three communities value the area's diversity of wild animals, natural scenic views, and wilderness areas; and agree that it is important to protect tidal flats and estuaries and beach/forest margins. Well over nine-tenths of the people in all three communities agree that it is important to protect salmon streams and beaches.

An important difference is that 54% of Tofino residents say that all the old-growth forests of Clayoquot Sound should be left in their natural state, compared with 9% in Ucluelet and 7% in Alberni. Large proportions say that at least some of the old-growth forests should be left in their natural state: 81% in Alberni, 77% in Ucluelet, and 36% in Tofino[8]. This illustrates that the communities are by no means uniform. In each community, there are substantial minority opinions on many of the issues.

But most people in all three communities agree with the basic idea behind the sustainable development strategy that environmental conservation and economic development can be compatible.

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6. Summary of community values surveys: 36.
7. Summary of community values surveys.
8. Summary of community values surveys: 24-32.

3. THE NUU-CHAH-NULTH PERSPECTIVE

The Native people residing on the west coast of Vancouver Island between Cape Cook and Jordan River are referred to collectively as the Nuu-chah-nulth.

The Nuu-chah-nulth approach to sustainability stems from their historical relationship with the land and the sea. They want the right to their homeland recognized, including the right to govern themselves and to manage their tribal territories and resources that are set aside through treaty negotiations agreed to by both governments.

Three Nuu-chah-nulth bands occupy a number of villages in the Clayoquot Sound area:

> The Hesquiaht, now living primarily at Hot Springs Cove, near the entrance to Sydney Inlet, and whose territory includes Hesquiat Peninsula and Hesquiat Harbour.
>
> The Ahousaht, living largely at Marktosis or "Ahousat" near the southwest tip of Flores Island.
>
> The Tla-o-qui-aht First Nations, formerly called the Clayoquot, living mainly at Esowista at the north end of Long Beach and at Opitsat on Meares Island.

These three Nuu-chah-nulth bands together have 40 reserves totally 1,055 hectares, most of them near traditional salmon streams. The Ucluelet Band has two reserves in the Clayoquot Sound area but does not occupy them.

In 1986, band members living on reserves made up 43.5% of the population of Clayoquot Sound. Including the off-reserve population, the Nuu-chah-nulth made up about 50% of the population of Clayoquot Sound.

The Nuu-chah-nulth population is younger and has a higher birth rate than the population of the Alberni-Clayoquot Regional District. Their economy also differs. Whereas forestry accounts for most of the employment in the Regional District, fishing is the leading employer of the Nuu-chah-nulth bands, providing 73% of present employment. At one time fishing was an even greater source of employment. Bands say that if fishing were restored, more Natives would return to it. Tourism is second, providing about 21% of employment and increasing. Forestry, aquaculture and mining account for about 3% of employment among the Clayoquot Sound bands.

The current unemployment rate of the bands is from 60% to 70%.

Culture and society

Centuries of living on the west coast resulted in what we know today as the historic Nuu-chah-nulth culture, greatly dependent on the marine and forest environments. The Nuu-chah-nulth developed an intimate knowledge and technology of deep sea fishing, river fishing, and sea mammal hunting with an emphasis on whaling. They also hunted deer, bear, elk, waterfowl, and many other species.

They used the plants of the forest and foreshore for food, artifacts and medicine. The western redcedar was most important, due to the variety of commodities it provided.

The Nuu-chah-nulth subsistence strategy depended on scheduling their activities around seasonally fluctuating wild plant and animal resources in a wide range of ecosystems. Now and then they moved to seasonal camps and villages, depending on the availability and abundance of food at such sites.

The use and management of these resources by the Nuu-chah-nulth is closely tied to their concept of ownership. Two terms— "tupaati" and "hahoothle"—are necessary to understand this concept.

"Tupaati", loosely translated as "hereditary privilege" refers to the pervasive ownership of almost everything of value. Such ownership rights were transferred by inheritance. Although "tupaati" were owned by individuals, they were really the collective property of the "house".

"Hahoothle" refers to the territorial rights or privileges and responsibilities of a chief, based on his ownership of real property. Rivers, fishing places, hunting and gathering areas, were all the private property of chiefs. The chief could convey this right to other individuals for their temporary use, but he still retained the right.

Despite the changes and population declines brought about by the effects of European contact, Nuu-chah-nulth institutions and patterns of land use remain essentially intact. As commercial economies were established in the area, the Nuu-chah-nulth adapted them to their lifestyle, modifying the annual round of hunting, fishing and gathering to accommodate the commercial aspects of fishing and sealing. This resulted in a great many employment opportunities, and young people left school because so many jobs were available. However, since 1960, with the downsizing of the fishing fleet due to a new licensing system and the closure of several processing plants, the Clayoquot Sound bands have practically lost any stable economic base. This condition persists to the present day.

Nuu-chah-nulth concerns about resource management in Clayoquot Sound

The Nuu-chah-nulth identify a number of resource problems that they perceive must be addressed for their condition to improve and for the local economy to be put on a sustainable basis.

Fishing, besides being a major source of employment, is the foundation of Nuu-chah-nulth culture and lifestyle. They regard its future as extremely important. The bands are not opposed to logging but they are most concerned about its impact on fish habitat. They believe that better regulation and enforcement by the Ministry of Forests and the Department of Fisheries and Oceans are needed. The bands feel they should be involved in the approval of any harvesting plan in their traditional areas. They favour the adoption of logging methods that do not damage fish habitat or cause erosion, improved buffer strips along streams, and more effective reforestation to minimize erosion.

The Nuu-chah-nulth are very concerned about the possible adverse effects of fish farming, especially any impact on existing genetic stocks and the potential for pollution. They recommend a ban on new fish farms until more information is available.

Some shellfish harvesting should be banned temporarily to stop the rapid declines in populations that have occurred in the last decade. Sufficient research should be conducted before allowing any more seafood species to be commercialized. Mechanical dredging should be banned.

The bands feel they have an important and prominent role to play in the enhancement of fisheries resources. They would like to see more attention paid to Native concerns such as the impact of sea lions and other predators, and some limits placed on the growing sport fishery.

They do not feel that the Department of Fisheries and Oceans alone can do an adequate job of regulation and management. They would like to see much more Native involvement in both specific enhancement projects and in the actual co-management of fisheries. They feel strongly that long term planning for resource management and much more control by local residents must be a cornerstone of sustainability.

The Nuu-chah-nulth perspective on the sustainable development strategy

The Nuu-chah-nulth are committed to participation in the development of a sustainable strategy for Clayoquot Sound and to the achievement of consensus to resolve the contentious resource issues facing the area.

However, because of their dependence on the area's natural resources and the recent decisions that confirm their rights to these resources, there is a need to clarify the principles that underlie Nuu-chah-nulth participation in the development of this strategy. The Nuu-chah-nulth believe that the long term wellbeing of the land is more important than any economic commodity from the land; and that their future is tied to the health of

the ecosystems that support their lifestyle. Therefore, they will support any strategy that protects the land base and restricts its exploitation to a sustainable level.
However, the goal of the Nuu-chah-nulth is to gain absolute control over traditional areas as a result of treaty negotiations, so that there will be enough resources and land under their control to allow all Nuu-chah-nulth who so desire to live in their communities in harmony with the environment. If the Nuu-chah-nulth are successful in this claim, they would still continue to practice the principles of sustainability, as they believe they have done for centuries. The Nuu-chah-nulth do not believe the present rate of resource exploitation is sustainable.

The bands intend to reassert their right to priority use of resources such as fish and other wild animals, as a result of court decisions that confirm this right. Allocation policies by government must increasingly recognize this priority and reflect it in allocation decisions. The bands believe in priority allocation to Natives, but do not support exclusive allocation to any group.

The Nuu-chah-nulth see the need for a major improvement in the management of natural resources, since demands will increase in future. The Nuu-chah-nulth alone will in all probability increase in number in the near future; and will expect their traditional homeland to be able to support this increase. For example, the birth rate of the Nuu-chah-nulth is much higher than the Canadian average; and there will be as many as 2,000 people in the Nuu-chah-nulth villages of Clayoquot Sound by the year 2010.

The level of post-secondary education has dramatically increased from 56 university students in 1989 to 109 in 1991, all with increased expectations.

The Nuu-chah-nulth are willing to sacrifice and live with lower rates of resource exploitation than at present, if this means the stocks of renewable resources can be built back up. They are unwilling to stand by while stocks continue to be depleted by the present excessive levels of exploitation.

The bands consider any land use decision that completely excludes logging as unacceptable, since it would affect economic viability and further alienate the land from potential Native use. They also feel that the present level of harvest is not sustainable in the long run and will jeopardize tourism opportunities. Their preferred option is a level of balanced harvest based on perpetual economic sustainability that looks well beyond a five-year plan.

The Nuu-chah-nulth have a vested interest in an improved local economy, but it must be sustainable in the long term. Whether the economy improves or not, the Nuu-chah-nulth intend to stay in this area in perpetuity.
Finally, the Nuu-chah-nulth are in the process of rebuilding their culture with strength and confidence. They intend to play a leadership role in the future of Clayoquot Sound.

4. PRINCIPLES OF SUSTAINABLE DEVELOPMENT

Sustainable development means improving the quality of human life while living within the carrying capacity of supporting ecosystems.
There are many ways of developing sustainably. There are also certain conditions that must be met. To help identify these conditions, the Steering Committee for the Clayoquot Sound Sustainable Development Strategy has adopted the following seven principles of sustainable development.

1. **Limit human impact on the planet to a level that is within carrying capacity.**

Human impact on the planet depends on the number of people multiplied by how much energy and raw materials each person uses or wastes. An excessive impact can be caused by a lot of people consuming a little; or by a few people consuming a lot. Carrying capacity is the capacity of an ecosystem to renew itself or to absorb wastes, whichever is less. Carrying capacity can be enhanced by careful management and improved technology, but it does have a limit, which must be respected.

2. **Maintain the stock of biological wealth.**

Other ways of expressing this principle are "conserve the conditions of life" or "preserve, protect, and enhance the environment". This requires:

> **A. Conserving life-support systems.** These are the ecological processes that allow land, water, air and life to be productive, to adapt and to renew themselves, and that include: maintenance of the chemical balance of the planet; stabilization of climate; recycling of nutrients; cleansing of air and waters; stabilization of water flow; and soil formation and regeneration.
> **B. Conserving the diversity of nature.** This means conserving the variety of different species of plants, animals and other organisms; the variety of different genetic stocks within each species; and the variety of different ecosystems.
> **C. Ensuring that all uses of renewable resources are sustainable.** Renewable resources include soil, wild and domesticated organisms, and ecosystems.

3. **Minimize the depletion of nonrenewable resources.**

This can be done by extending the "life" of nonrenewable resources—for example, by recycling and by using less of a resource to make a particular product.

4. **Promote long term economic development that increases the benefits from a given stock of resources and maintains natural wealth.**

This requires:
- Promoting technologies that use resources more efficiently.
- Ensuring that users of resources face the full costs to society of their decisions, for example through prices, taxes, and other economic instruments.
- Ensuring that measures of economic performance include the costs of environmental damage and changes in the stock of natural resources.
- Improving and diversifying our present high-volume resource industries, and developing high-value service and information industries that create wealth from the processing of information (for example, computer mapping systems).
- Adopting an approach to decision making that anticipates and tries to prevent problems and that involves all sectors affected by a decision.

5. **Aim for an equitable distribution of the benefits and costs of resource use and environmental management.**

The benefits and costs of resource use and environmental protection have not always been shared equitably among different communities and interest groups, among regions that are poor and those that are affluent, and between our generation and those who will come after us.

The transition to sustainability will mean more difficulties for some communities and interest groups than for others. But change can be managed to limit negative and disruptive impacts. As communities discover the need for change, programs to ensure the shift away from unsustainable activities will need to be created. Mechanisms for ensuring job and business stability during and after transition and the opportunity for affected parties to make choices will need to be an integral part of these programs.

6. **Provide for effective participation of communities and interest groups in the decisions that most affect them.**

Communities and individuals need to gain greater control over their lives. Policies and actions to achieve sustainability should be identified on the basis of common understanding and general agreement of all concerned.

7. **Promote values that help achieve sustainability.**

An ethic of sustainability needs to be promoted, including respect for nature and for the diversity of human societies. Values that foster, or are compatible with, sustainability should be supported. Values that encourage unsustainable practices need to be changed.

5. PUTTING THE PRINCIPLES INTO PRACTICE: GOALS OF THE STRATEGY

In this chapter we look at the main implications of the principles of sustainable development for the Clayoquot Sound Sustainable Development Strategy. And we discuss goals and targets to put the principles into practice. The goals are listed in Box 4.

The chapter sections follow the order of the principles in the previous chapter:
Carrying capacity (principle 1)
Life-support systems and natural diversity (principle 2A and B)
Sustainable use of resources (principles 2C and 3)
Long term economic development (principle 4)
Equity (principle 5)
Education, motivation and participation (principles 6 and 7)

Box 4. Proposed goals of the Strategy

1. Maintain life-support systems: air quality and the health of the atmosphere; water quality and the integrity of water bodies; soil quality.
2. Maintain the variety and integrity of ecosystems, and the diversity of species and genetic stocks.
3. Ensure that every resource use is sustainable.
4. Provide a secure base for the main resource industries and maintain their competitiveness.
5. Strive for reliable and rewarding employment.
6. Ensure that all interests coexist fairly.

Carrying capacity

Throughout this document ecosystems are referred to as natural, modified, cultivated, built, or degraded, depending on how they have been affected by people. The classification is explained in Box 5, and is applied to forest lands in Chapter 7.

Box 5. Classification of ecosystem conditions

NATURAL ECOSYSTEMS. Ecosystems where, since the industrial revolution (about 1750), human impact (a) has been no greater than that of other native organisms, and (b) has not affected the ecosystem's structure. Human impact excludes changes of global extent, such as climate change due to global warming. Clayoquot Sound's old-growth forests are examples of natural ecosystems.

MODIFIED ECOSYSTEMS. Ecosystems where human impact is greater than that of any other species, but that are not cultivated. There can be a wide range of modified ecosystems, from those that are close to natural to those that are close to cultivated. Clayoquot Sound's second-growth forests are examples of modified ecosystems.

CULTIVATED ECOSYSTEMS. Ecosystems that are largely cultivated. Cultivated here means (a) stocked with non-native species, or (b) stocked with native species under intensive management, such as regular fertilization, pest control, pruning. Second-growth forests where non-native species or genetic stocks are dominant are examples of cultivated ecosystems.

BUILT ECOSYSTEMS. Ecosystems dominated by buildings, roads, railways, airports, docks, dams, and other human structures. Includes urban and suburban gardens, parks, and golf courses. Tofino is an example of a built ecosystem.

DEGRADED ECOSYSTEMS. Modified or cultivated ecosystems whose diversity and productivity have been so reduced that they are unlikely to recover without rehabilitation or restoration measures.

Carrying capacity, ecosystem integrity, and sustainable harvest levels vary with the condition of the ecosystem—whether it is natural, modified, or cultivated.

For example, an area of farmland will support more people than the same area of wild land. In other words, a cultivated ecosystem has a higher carrying capacity *for people* than a natural ecosystem. It is still important to use the cultivated ecosystem sustainably, otherwise it will degrade and its capacity to support people will drop. But what needs to be done to make sure that uses are sustainable will be different for farmland than for wild land.

Similarly, more fibre can be taken sustainably over a period of time out of a modified forest than out of a natural forest. The capacity of a modified forest to provide a sustainable yield of fibre *for use by people* is greater than that of a natural forest, so harvest levels can be higher and still be sustainable.

This does not mean that we should modify all forests, just as we should not turn all forests into farmland. A combination of natural, modified, cultivated and built ecosystems is required to keep our environment healthy and enable it to provide for both immediate and long term human needs.

Natural and modified ecosystems:

- Maintain life-support systems: air quality and the integrity of the atmosphere, water quality, and everything that makes the earth fit for life including human life.
- Conserve natural diversity: the full array of ecosystems, species, genetic stocks, and the habitats of fish and other wild resources.
- Provide for sustainable resource use to yield a host of valuable products from plants and animals (all wild, except in the case of aquaculture): timber, fisheries, aquaculture, forage, food, medicines, nonwood fibres, furs and skins, and many others.
- Provide areas for scientific research and education.
- Provide areas for recreation and tourism.

Natural ecosystems are better than modified ecosystems at providing some of these goods and services:

- Conserving soil and water in zones that are highly erodible if the original vegetation is removed, notably the steep slopes of upper catchments and streamside zones.
- Supporting species and populations that are highly sensitive to human disturbance.
- Providing areas for wilderness recreation and tourism.
- Providing areas for baseline monitoring and long term research to help us understand ecological processes and natural diversity, and assess the sustainability of our uses of modified, cultivated and built ecosystems.

Modified ecosystems are better than natural ecosystems at providing other goods and services:

- Producing sustainably large quantities of timber and other wild renewable resources.
- Supporting species that do well under modified conditions.
- Providing areas for outdoor recreation and tourism other than wilderness recreation and tourism.
- Providing areas for experimental research to help us understand our impacts on the environment.

Cultivated ecosystems are needed to:

- Provide the bulk of the food and other agricultural products used by people.
- Take advantage of genetic improvements and intensive management to produce higher yields of fibre than could be obtained sustainably from modified ecosystems.

Built ecosystems are needed to:

- Provide people with places to live.
- Provide infrastructure (water supply, energy supply, transportation, communications, waste disposal).

Virtually all exploration and production of mineral resources occurs in natural, modified, and cultivated ecosystems. Aquaculture in Canada occurs in modified ecosystems.

We need a combination of natural, modified, cultivated and built ecosystems; but how much should we have of each? We don't know. The latest international advice[1] concerning natural and modified ecosystems is to:

> Maintain remaining natural ecosystems, unless there are overwhelming reasons for change, but in general not less than 10% of the total land area.
>
> Work out ways of using such ecosystems sustainably, thereby improving their economic and social value.
>
> Maintain as large an area as possible of modified ecosystems to support a diversity of sustainable uses and species.
>
> Adopt targets for the proportions of the territory to be maintained as natural and as modified ecosystems, together with plans for the targets' achievement.

The following targets are suggested:

1. No degraded ecosystems.

2. Keep natural:

   - Areas that are highly erodible if the original vegetation is removed.
   - Core areas for protecting wild species, particularly species that are sensitive to human disturbance.

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1. IUCN/UNEP/WWF 1991.

- 10% of each major ecosystem, ensuring that this includes a viable example of every vegetation type or plant/animal community. In our case a major ecosystem of the land is a biogeoclimatic unit; and a vegetation type is a stand association.
- Priority areas for wilderness recreation and tourism.
- An area suitable for baseline monitoring.
- Areas that do not need to be modified, cultivated or built.

The above areas could overlap. In other words, an area suitable for baseline monitoring might also be suitable for wilderness recreation; areas that do not need to be modified, cultivated or built might be suitable as core areas for protecting wild species; and so on.

3. Maintain a sufficient area of modified ecosystems to meet the needs for:

- Timber production.
- Fisheries and the production of other wild renewable resources.
- Aquaculture.
- Outdoor recreation and tourism other than wilderness recreation and tourism
- An area suitable for experimental research.

4. Designate a proportion of medium-quality and good-quality forest sites (breast height at age 50 site index 20 or better) either as cultivated ecosystems or as modified ecosystems devoted to fibre-production. Such sites are considered potentially suitable for intensive silviculture, because they are productive enough to repay the costs involved. Not all of these productive sites should be devoted to fibre-production, since some will need to be protected or managed to conserve natural diversity.

Boxes 6 through 9 at the end of this chapter show the relationship between these targets and the goals and targets proposed below. Boxes 8 and 9 show which uses would be permitted or excluded in natural, modified, or cultivated ecosystems.

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2. Whether core areas are needed for all species or just for species that are sensitive to human disturbance has not been resolved.

Life-support systems and natural diversity

Goal 1. Maintain life-support systems:

- **Air quality and the health of the atmosphere;**
- **Water quality and the integrity of water bodies;**
- **Soil quality.**

Air quality and the health of the atmosphere

Target 1.1:

> Limit emissions to the air to levels that do not harm people or other species or the integrity of ecosystems.

Air quality in Clayoquot Sound is good, and we are probably meeting this target already. Slashburning is no longer a common practice in the area. Prescribed burning is decreasing. Smoke and other emissions to the air from houses and businesses is insignificant due to the low population.

Emissions of carbon monoxide, hydrocarbons and nitrogen oxides from vehicles and boats may be a problem in summer. Those from vehicles could be reduced by a "park and ride" scheme for tourists in Tofino. Otherwise, vehicle and boat emissions can be controlled only through provincial air quality and energy conservation policies, which are outside the scope of this strategy.

To maintain air quality and the health of the atmosphere, we also need to stop increasing the atmospheric concentration of carbon dioxide and other "greenhouse" gases. The burning of anything that contains carbon—fossil fuels (oil, gas, coal), wood and vegetation—produces carbon dioxide, the most important of the "greenhouse" gases. International and national targets for carbon dioxide reduction have been set. A provincial policy is needed to achieve them. Most likely this would focus on reducing the burning of fossil fuels, the main cause of the problem. But some combination of maintaining as much land as possible under forest, conserving old-growth, lengthening rotations, and increasing the life of wood products would give useful support. Appendix 1 gives more information.

Water quality and the integrity of water bodies

Target 1.2:

Limit emissions to water to levels that do not harm people or other species or the integrity of ecosystems.

The main pollution problems are:

Sewage discharges from settlements. This does not appear to be a problem at present. But given the importance of the marine habitats of Clayoquot Sound, the effects of wastewater discharges on species and ecosystems should be monitored and regularly assessed.

Discharges of wastes from boats. Of some concern, particularly from boats moored close to shellfish farms. Can be controlled by providing waste disposal facilities and by prohibiting anchoring within 125 metres of shellfish farms.

Fish farm wastes. Can be controlled by limiting the number of fish farms, siting them carefully, and operating them efficiently.

Logging wastes. Can be controlled by dryland sorting, bundling, limiting the number of log dumps and siting them carefully.

Marine oil pollution. This is a threat to wildlife, fisheries, and tourism, and is of great concern to people up and down the coast. Needs are: clear contingency plans for each type of fuel and each type of shoreline, including clear priorities; a system of fast response with a source of immediate funds; baseline information on shoreline sensitivities, winds and tidal currents; an adequate number of people trained in safety and cleanup procedures; strategically placed stores of cleanup equipment; clear treatment protocols under various conditions.

Ballast water. Ballast water is a source of exotic species that may compete with or prey on native species. Controlling this widespread problem requires research and legislation at the national level.

Target 1.3:

Maintain the integrity of all freshwater and tidal ecosystems, restoring any that are degraded.

The precise meaning of this target needs to be defined. This can be done by developing an "index of biotic integrity" (IBI) for freshwater ecosystems and one or more IBIs for tidal ecosystems. IBIs assess water resource quality by integrating several measures of fish species richness and composition (numbers and kinds of different species); proportions of species that are omnivores, insectivores, and top carnivores; and fish abundance and condition. IBIs have been developed for seven different regions of the USA, including western Oregon[3].

3. Miller & others 1988.

Once we have an index of biotic integrity that is valid for western Vancouver Island, we can use it to rate the integrity of Clayoquot Sound's streams and lakes. Streams and other water bodies would be rated as: excellent; good; fair; poor; very poor; or no fish.

The index can be used to assess the impacts of changes in water yield, peak flows, temperature, nutrients, sediment and bedload transport patterns, and channel stability. Forests are important for regulating the local hydrological cycle, protecting soils from excessive erosion and reducing the silt loads of rivers, slowing runoff, and moderating floods and other harmful fluctuations in streamflow. They should be managed to continue these functions.

Knowledge of what needs to be done is being obtained through the Fish/Forestry Interaction Program. However, it will take many more years to understand long term relationships between coastal forests and the water cycle. Meanwhile, the following strategy seems sensible:

Use watersheds or groups of watersheds (5,000-20,000 hectares) as the basic units for assessing the pros and cons of different resource uses (see Chapter 11).
Apply what we know. This is set out in the *Coastal Fisheries/Forestry Guidelines*[4] and the *Guide for management of landslide-prone terrain in the Pacific Northwest*[5]. Identify and avoid destabilizing sensitive slopes and channels. Maintain channel through appropriate riparian (streambank) treatment and maintenance of coarse woody debris. Encourage high quality road construction and erosion control through design and vegetation. Avoid road development on sensitive soils and slopes. Avoid harvesting on landslide-prone areas. Continue to rehabilitate hill slopes that have been degraded by past road building or logging.

Establish a baseline monitoring area.

Soil quality

Target 1.4:

> Limit soil erosion to normal rates.

Soil erosion is a natural process. It is pointless to try to prevent it. However, local ecosystems have evolved to cope with "normal" rates of erosion. If the rates are significantly increased above normal, they can damage the integrity of streams and lakes, and lower the productivity of the land. Similarly, in young mountain systems such as Vancouver Island's, landslides are a natural phenomenon—often occurring in old-growth forests. We cannot prevent them altogether; but we can limit their number and severity

4. The guidelines are being revised.
5. Chatwin & others 1991.

and minimize their effects. All lands in Clayoquot Sound that are proposed for logging or other development should be assessed for instability. And all developers should follow scrupulously the procedure for assessing, avoiding and managing unstable terrain set out in the *Guide for management of landslide-prone terrain in the Pacific Northwest*[6].

Goal 2. Maintain the variety and integrity of ecosystems, and the diversity of species and genetic stocks.

This goal is covered in Chapter 6, so will only be outlined here.

The variety and integrity of ecosystems

Target 2.1:

> Maintain at least one viable example of every vegetation type or plant/animal community.

Target 2.2:

> Maintain the integrity of ecosystems.

The integrity of ecosystems means their productivity, diversity, and capacity to renew themselves and adapt to change without breaking down. The integrity of natural ecosystems can be maintained by protecting them from human-caused changes to which they are not adapted—either in large natural units such as an entire watershed or surrounded by a buffer zone.

The integrity of modified ecosystems can be maintained by conserving water and soil (Goal 1) and retaining those features that enable ecosystems to stay productive, adapt to change, and renew themselves. In the case of the coastal rain forest, it will take many years before we know for sure what those features are. They are believed to include standing green trees, standing dead trees, downed trees, long stages of juvenile forest (shrub-seedling and pole-sapling stages), and long stages of old forest (mature and old-growth stages) (see Chapter 6).

The integrity of cultivated ecosystems can be maintained largely by conserving water and soil (Goal 1).

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6. Chatwin & others 1991.

The diversity of species and genetic stocks

Target 2.3:

> Maintain all naturally occurring species and major genetic stocks in sufficient numbers for them to survive over the long term and adapt to change.

A major genetic stock is a visually recognizable subspecies, variety or form, or (in the case of invisible genetic variation) a population associated with a particular geographic area. The geographic area may be an ecological region or a drainage basin, depending on the species.

Sustainable use of resources

Goal 3. Ensure that every resource use is sustainable.

Renewable resources

Target 3.1:

> All uses of renewable resources to be sustainable.

At a minimum, this means that any use of a renewable resource should be within the carrying capacity of the resource and ecosystems concerned.
A use of a wild species is sustainable if certain criteria are met concerning the impact of the use on the target population, its habitat, and on other (non-target) species and ecosystems. Suggested criteria are:

1. The size of the target population stays within the normal range. It should be monitored over several generations to determine what this is. At least one population should be protected from use to provide a long term benchmark.

2. The composition of the target population—sex ratio, age classes, genetic composition—may change provided the long term viability of the population is not compromised. Major genetic variants of a harvested species are conserved.

3. The habitat requirements of the target population are identified and met. Use of the target population does not reduce the capacity of the habitat to support the species.

4. Uses of animals do not cause avoidable suffering.

5. Harvest levels allow for the needs of other species.

6. The use is compatible with the maintenance of air quality, the health of the atmosphere, water quality and the integrity of water bodies, the variety and integrity of ecosystems, and the diversity of species and genetic stocks. It is also compatible with the sustainable use of other wild resources.

When two or more species are harvested at once (multi-species fisheries, logging), whether deliberately or accidentally, the first five criteria should be applied to the most sensitive species.

There can be two levels of sustainable use:

> *Basic sustainable use* means use that is within the resource's capacity for renewal. This requires that the size and composition of the harvested population remain stable and the ecological processes and natural diversity that support it are conserved. The first three criteria must be met for a use to be basically sustainable. Failure to meet these criteria will cause populations to decline and eventually threaten the survival of major genetic variants and ultimately the species.
>
> *Fully sustainable use* means use that is within the resource's capacity for renewal and sustains all other resource values. This requires that the conditions for basic sustainability are met, that use does not cause avoidable suffering, and that the ecological processes and natural diversity needed to sustain *other* values (including other resource sectors) are conserved. All six criteria must be met for a use to be fully sustainable.

Nonrenewable resources

Target 3.2:

> All uses of nonrenewable resources to be compatible with sustainability.

Uses of nonrenewable resources cannot be sustainable in the sense that uses of renewable resources can. But they can be made compatible with sustainability by ensuring that:

- They do not harm air or water quality.
- Any damage to ecosystems or species is temporary.
- Affected ecosystems are rehabilitated, or preferably restored to their original condition.

In other words, uses of nonrenewable resources must ensure that the ecological processes and natural diversity needed to sustain *other* values (including other resource sectors) are conserved. Provincial and federal acts and regulations that ensure environmental impacts are minimized and reclamation is maximized are intended to achieve this.

Mining can bring a bigger economic benefit per unit of land than can renewable resource uses. Provided it meets the above conditions, it can thereby make a valuable contribution to sustainable development.

Long term economic development

Goal 4. Provide a secure base for the main resource industries and maintain their competitiveness.

We need to assure the resource base required by the main resource industries for them to remain competitive, maintain economic viability, and provide a secure and sustainable supply of fibre and other forest resources, seafood and other aquatic resources, tourism products, and minerals.

Target 4.1:

> Provide the timber industry with a secure base of productive timber-growing land that is operable under current conditions. The land area must be large enough for the industry to be economically viable. Management requirements must be sufficiently stable for the industry to plan its operations efficiently.

Target 4.2:

> Support fisheries by restoring and maintaining the populations of harvested species; protecting spawning and rearing habitat and fishing grounds; and restoring salmon streams to their full production potential.

Target 4.3:

> Provide aquaculture with sites for fish and shellfish farms with good water quality.

Target 4.4:

> Support tourism by protecting the features that will continue to attract tourists to Clayoquot Sound and that tourists visit and use.

Target 4.5:

> Provide mining with access to land for mineral exploration and economic concentrations of minerals.

Goal 5. Strive for reliable and rewarding employment.

Target 5.1:

> In the timber industry, stop the decline of jobs per unit of wood harvested. Then increase the number of jobs per unit of wood harvested.

Target 5.2:

> In the tourism industry, extend the high season.

[Equivalent targets to be proposed for the other resource industries.]

Of course, it is one thing to set these targets, and quite another to achieve them. Economic development can be brought into harmony with ecological sustainability by increasing the efficiency of resource use: getting more benefits from a given stock of resources. The aim is to increase the ratio of jobs and income to production, and the amount of value added per unit of resource. But all of this must be done while maintaining and if possible improving competitiveness.

Most people in the region agree that the local economy should be more diversified. This does not mean expanding one industry at the expense of another, but diversifying them all.

For example, more than two-thirds of the people in all three communities believe that manufacturing of wood products should be a bigger part of the local economy. Majorities in Alberni and Ucluelet agree that tourism should be a bigger part of the local economy. In Tofino there is a clear desire for more small-scale, locally initiated tourism development, that does not harm the environment, and increases environmental awareness.

Diversification and increasing value-added will be difficult to achieve. One possibility is to market Alberni-Clayoquot as a sustainable development region, both for tourism and for general economic development. Make a commitment to sustainability, stick to it, and cash in on it, so making a virtue out of necessity. This would also provide the conditions for increasing value added *and* diversifying successfully.

Increasingly, environmentally aware consumers are demanding "environmentally sound" products. We should explore the scope for developing a market for higher value timber and seafood products guaranteed to have been produced sustainably. Strict criteria of sustainability would be published. Adherence to the criteria would be audited independently. A brand licence would be registered. Purchasers of licensed timber or seafood could assure their customers that the products have been produced sustainably. Tourists could be attracted to the region specifically for its commitment to living sustainably (see Chapter 9).

Equity

Goal 6. Ensure that all interests coexist fairly.

Goal 4 calls for us to secure the resource base of all the resource sectors. Goal 5 suggests diversification in ways that do not pit one industry against another. Obviously no single industry or interest can have everything, nor should any interest be left with virtually nothing. Achieving these and other goals involves a tricky balancing act.

Many groups of people have an interest in Clayoquot Sound. Any decision about the resources and environment of the area is likely to benefit some more than others and to cost some more than others. The costs and benefits should be shared fairly by everybody concerned. They include people who live in the area; people who live outside but have a stake in the area; and future generations.

The people who live in Clayoquot Sound have a stake in the area because they live there. It's the direct source of livelihood of many of them and the home and backyard of them all. They have emotional, cultural and economic ties to the way the land is now (or, in some cases, was until recently).

They include the Nuu-chah-nulth bands, who claim all of the lands, waters and resources of Clayoquot Sound as part of their traditional territory. Unsustainable resource use or widespread long term changes to the land base preempts this claim.

People who live in the region but outside Clayoquot Sound also have a stake in the area. They, too, rely on it for their livelihood. The interest of people in the logging industry is economic—a matter of jobs and money. It is also cultural—because logging is part of their way of life and a mainstay of their communities. In addition, many people in the Ucluelet area feel that Clayoquot Sound is their backyard too, particularly the closest parts such as the Kennedy watershed and Tofino Inlet.

People who live outside the region also have an interest in Clayoquot Sound, as part of natural heritage and economy of the province, the nation, and the world.

The interest of future generations is in inheriting from us a Clayoquot Sound with as full a range of intact values as we inherited from our forebears.

We should first try to combine these interests, because many are compatible. Then we should find a fair way of balancing any interests that conflict.

Education, motivation and participation

The change to sustainability must be fair and achieved with humanity. The keys to this are education, motivation, and participation. People need to understand why they should live sustainably and be equipped with the knowledge and skills to do so (education and training). They need to want to live sustainably (by believing in an ethic of living

sustainably that is backed up by economic incentives and the law). And they need to have a real say in the decisions about the economy and the environment that will enable society to be sustainable.

It will not be enough for us to decide the fate of Clayoquot Sound and then get on with our lives. There is a lot of mutual education to be done and everyone must have a chance to be involved. People who think they understand economic and political reality need to understand the ecological basis of our economic and social life; and they need to have a bit more sympathy for the natural world. People who think they understand ecological reality need to understand that economies and societies take time to change without collapsing; and they need to have a bit more sympathy for their fellow human beings.

Box 6. How Goal 1 applies to different ecosystem conditions

TARGETS	NATURAL ECOSYSTEMS	MODIFIED ECOSYSTEMS	CULTIVATED ECOSYSTEMS	BUILT ECOSYSTEMS
1.1. Air quality: limit emissions to non-harmful levels	Applies in full.	Applies in full.	Applies in full.	Applies in full.
1.2. Water quality: limit emissions to non-harmful levels	Applies in full.	Applies in full.	Applies in full.	Applies in full.
1.3. Restore & maintain integrity of freshwater & tidal ecosystems	Applies in full: no loss of integrity.	Applies in full: no loss of integrity.	Applies in full: no loss of integrity.	Applies in part: moderate loss of integrity.
1.4. Limit soil erosion to normal rates	Applies in full.	Applies in full.	Applies in full.	Does not apply.

Box 7. How Goal 2 applies to different ecosystem conditions

TARGETS	NATURAL ECOSYSTEMS	MODIFIED ECOSYSTEMS	CULTIVATED ECOSYSTEMS	BUILT ECOSYSTEMS
2.1. Maintain at least one viable example of every vegetation type & plant/animal community monitoring area.	Protect at least 10% of each major ecosystem, including a baseline	Retain rare vegetation types & plant/animal communities.	Retain rare vegetation types & plant/animal communities.	Retain rare vegetation types & plant/animal communities.
2.2. Maintain the integrity of ecosystems	Fulfill Goal 1 + protect ecosystems in large natural units or surround by a buffer zone.	Fulfill Goal 1 + identify & retain key features.	Fulfill Goal 1	Fulfill Goal 1
2.3. Maintain all naturally occurring species & genetic stocks	Protect core areas for all species, especially sensitive ones	Retain habitats for all native wild species & genetic stocks	Retain rare or particularly important habitats.	Retain rare habitats.

Box 8. How Goal 3 applies to different ecosystem conditions

TARGETS	NATURAL ECOSYSTEMS	MODIFIED ECOSYSTEMS	CULTIVATED ECOSYSTEMS	BUILT ECOSYSTEMS
3.1. All uses of renewable resources to be sustainable	Permitted any use of a wild species that that does not modify habitats. Uses must be within carrying capacity & compatible with Goals 1 & 2 & other permitted uses.	Permitted any use of a wild species. Uses must be within carrying capacity & compatible with Goals 1 & 2 & other permitted uses —except that resource production may be given priority in some areas, in which case Target 2.3 may be changed to "retain rare or particularly important habitats".	Permitted any use of a renewable resource. Uses must be within carrying capacity & compatible with Goals 1 & 2.	Does not apply.
3.2. All uses of nonrenewable resources to be compatible with sustainability	Must be compatible with Goals 1 & 2 & needs of permitted uses of renewable resources. Excluded from protected areas.	Must be compatible with Goals 1 & 2 & needs of permitted uses of renewable resources.	Must be compatible with Goals 1 & 2 & needs of permitted uses of renewable resources.	Usually excluded.

Box 9. How Goal 4 applies to different ecosystem conditions

TARGETS	NATURAL ECOSYSTEMS	MODIFIED ECOSYSTEMS	CULTIVATED ECOSYSTEMS	BUILT ECOSYSTEMS
4.1. Timber production	Excluded from protected areas. Permitted elsewhere, if compatible with Goal 3.	Permitted. Required for production: poor, medium & good quality sites that are operable & economically accessible.	Permitted. Required for production: medium & good quality sites that are operable & economically accessible.	Excluded. Provide infrastructure & markets.
4.2. Fisheries	Permitted, if compatible with Goal 3. Required for spawning & rearing habitat.	Permitted. Required for harvesting & or spawning & rearing habitat.	Permitted. Spawning & rearing habitat may occur in cultivated ecosystems.	Excluded. Provide infrastructure & markets.
4.3. Aquaculture	Excluded.	Permitted. Required: good water quality.	Permitted. Required: good water quality.	Excluded. Provide infrastructure & markets.
4.4. Tourism	Permitted, if compatible with Goal 3. Required for wilderness tourism.	Permitted. Required for outdoor recreation other than wilderness tourism.	Permitted. Contribute to outdoor recreation other than wilderness tourism.	Permitted. Required for urban tourism. Provide infrastructure & markets.
4.5. Mining	Excluded from protected areas. Permitted elsewhere, if compatible with Goal 3. Required for exploration & access to economic concentrations of minerals.	Permitted, if compatible with Goal 3. Required for exploration & access to economic concentrations of minerals.	Permitted, if compatible with Goal 3. Required for exploration & access to economic concentrations of minerals.	Usually excluded. Provide infrastructure & markets.

6. MAINTAINING NATURAL DIVERSITY

Goal

The goal of this part of the Clayoquot Sound Sustainable Development Strategy is to conserve the variety and integrity of the ecosystems, species and genetic stocks that occur naturally in Clayoquot Sound; and as far as possible to do so in ways that allow a secure base for the main resource industries. This requires:

Maintaining at least one viable example of every vegetation type or plant/animal community.

Maintaining the integrity of ecosystems.

Maintaining all naturally occurring species and major genetic stocks in sufficient numbers for them to survive over the long term and adapt to change.

It is widely accepted that the only workable strategy to achieve these aims is a combination of protected areas (parks and reserves) and management of land and water uses outside protected areas. Protected areas can safeguard particularly valuable, rare or sensitive places, and provide a degree of insurance in case our ideas of sustainable management are wrong. But since they will never cover more than a small percentage of the territory, parks and reserves can maintain only a fraction of existing diversity. We need to manage for diversity throughout the landscape.

This approach—a combination of protected areas and management for diversity throughout the rest of the landscape—has been adopted by the Provincial Government and included in the draft management and working plans for TFLs 44 and 46.

Action 1.1 Adopt a protected areas plan for Clayoquot Sound.

A protected area is an area dedicated primarily to protection and enjoyment of natural or cultural heritage, to maintenance of natural diversity, or to maintenance of life-support systems. The functions and benefits of protected areas are listed in Appendix 2.

Parks and reserves are needed in Clayoquot Sound to protect:

1. At least 10% of each major ecosystem, ensuring that this includes a viable example of every vegetation type or plant/animal community.

2. Core areas for wild species, particularly species that are sensitive to human disturbance.

3. Important heritage sites.

4. A baseline monitoring area.

5. Priority areas for wilderness recreation and tourism.

Criteria for the first and second items are to protect a sample of every biogeoclimatic unit (see Box 10), stand association, and coastal feature (see Box 11), either as part of large natural units such as entire watersheds or in smaller units surrounded by a buffer zone. A check should be made to ensure that these criteria will result in coverage of all vegetation types and plant/animal communities. Criteria for a baseline monitoring area are listed in Chapter 7. Criteria should be developed for items 3 and 5.

According to the Ministry of Environment's classification of ecosystems, Clayoquot Sound is part of the Western Vancouver Island Ecoregion, which is part of the Coast and Mountains Ecoprovince. Special attention should be paid to features not well represented elsewhere in the Ecoregion or Ecoprovince, as this provides a means of assessing their provincial, national and international importance (see Appendix 3).

Box 10. Biogeoclimatic units of Clayoquot Sound

Coastal Western Hemlock (CWH)	**[sea level to 900 m]**	**90% of area**
Very Wet Hypermaritime CWH		
[CWHvh: sea level to 150 m]	30% of area	
Very Wet Maritime CWH, Submontane		
[CWHvm1: sea level to 600 m]	50% of area	
Very Wet Maritime CWH, Montane		
[CWHvm2: 600-900 m]	10% of area	
Mountain Hemlock (MH) [900-1500 m]		**9% of area**
Moist Maritime MH		
[MHmm: 900-1300 m]	7% of area	
Moist Maritime Parkland MH		
[MHmmp: 1300-1500 m]	2% of area	
Alpine Tundra (AT) [above 1500m]		**1% of area**

Source: Natural Environment study

Box 11. Classification of coastal features of Clayoquot Sound

The Clayoquot Sound coastline consists of oceanic wave-exposed shores and sheltered and semi-sheltered shores.

Oceanic wave-exposed shores:

- Exposed rocky coast (primarily non-sedimentary rocky shores and adjacent subtidal areas).
- Exposed sandstone reefs (predominantly sandstone intertidal reefs and shores).
- Exposed seacaves.
- Exposed boulder/cobble beaches.
- Exposed sand beaches.

Sheltered and semi-sheltered shores:

- Channels, islands & bays.
- Fjords (long channels with steep walls continuing some distance below the surface and typically headed by a river carved into a canyon).
- Lagoons.
- Narrows with high velocity tidal currents. Subtidal areas at or near these narrows are hotspots of diversity.
- Estuaries. Each estuary may have distinctive characteristics in terms of bird species and populations and should be preserved intact.
- Mudflats & mixed sediment flats.
- Shallow banks. Eelgrass beds are major contributors to primary productivity. The banks and associated eelgrass beds are important for herring spawning and the crab fishery in Clayoquot Sound.

Source: Natural Environment study

The seven protected areas in Clayoquot Sound (Box 12) should then be reviewed to see to what extent they cover the criteria. The review should build on assessments in progress for provincial parks and ecological reserves.

In the past, provincial parks in BC have not been established on the basis of clear criteria or a comprehensive review. But recently BC Parks has adopted a systematic approach, reviewing the coverage of parks in light of two conservation goals and four recreation goals. BC Parks' procedure for assessing the needs of the parks system in Clayoquot Sound is to identify the goals or portions of goals not met in this part of the province and then determine which areas in Clayoquot Sound might satisfy these goals. This has been done through the 1991 Parks and Forest Wilderness for the '90s program, supplemented by field work conducted in 1986 on the west coast of Vancouver Island and the recommendations of the 1988 Strathcona Park Advisory Committee. The results are summarized in Appendix 4.

Box 12. Protected areas in Clayoquot Sound

Pacific Rim National Park, Long Beach Unit (part: drainages north of Quisitis Point). Land area: 6,921 hectares; sea area 5,422 hectares; total area 12,343 hectares.

Strathcona Provincial Park (part: Moyeha, upper Bedwell and upper Megin drainages). 31,920 hectares.

Gibson Marine Provincial Park. 140 hectares.

Maquinna Provincial Park. 39 hectares.

Megin River Ecological Reserve. 50 hectares.

Cleland Island Ecological Reserve. 7.7 hectares.

Sutton Pass Ecological Reserve. 3.4 hectares.

Total protected land area: 39,081 hectares.

Total protected land area as % of total land area (268,317 hectares): 14.6%. Note the protected land area includes fresh waters but the total land area does not. The true % is therefore lower than these.

Total protected land + sea area: 44,503 hectares.

Total protected land + sea area as % of total area (approximately 350,000 hectares): about 12%.

Similarly, a systematic evaluation of the extent to which the variety of biogeoclimatic units and other ecosystems is represented in ecological reserves is under way (see also Appendix 4).

Protected area systems will lose species and habitats as a result of climate change, unless they are designed to allow for changes in species' distributions. This means that they must[1]:

- Protect the diversity of physical environments.
- Contain a range of environments to allow organisms to adjust their local distribution in response to climate change. A diversity of topography (flat land, hilly land, a variety of hill slopes and aspects) and a range of elevations are particularly important. For example, a range of 450 metres in elevation would allow for upward movement of species in response to a 3°C increase in temperature, if soil and microclimate are suitable.
- Be linked by corridors of suitable habitat to allow species to change their continental distributions.

Also, according to the "island" theory, protected areas will lose species if they become "islands" of suitable habitat surrounded by a "sea" of unsuitable habitat. This is because many species require larger territories for their long term survival than can be provided by even the biggest protected area. There are two ways to avoid the "island effect". One is to manage the land (or water) around the protected area so that it does not become an "island". The other is to provide corridors of suitable habitat between one "island" and another.

It is important to note that the "island" theory has been developed in response to the clearing of natural vegetation and its outright replacement by agricultural and urban land. A forest of native trees surrounded by a large tract of farmland is clearly an island: the farmland forms a barrier to many forest species. This is probably not the case when old-growth forest is surrounded by second-growth forest—provided key habitats are maintained and the effects of forest fragmentation are avoided (see Action 1.2).

Whether habitat is suitable or unsuitable depends on the species concerned. The most demanding species in terms of the area required to support a viable population for hundreds of years are the large carnivores, such as cougars, wolves, wolverines. These animals require a territory several times larger than *all* of Clayoquot Sound. But much of this area may be modified, as long as it includes a core of natural habitat.

One or more intact watersheds (see Appendix 5) could provide the core area of natural habitat but other large areas (not necessarily intact watersheds) could also serve the

1. Hunter & others 1988.

purpose. The value of intact watersheds is more that they usually contain a diversity of physical environments and topography, and a range of elevations, in an area that is relatively well buffered by natural boundaries from many kinds of external change. This also makes them good candidates for a baseline monitoring area.

Action 1.2 Adopt management guidelines to conserve the natural diversity of forests[2].

To maintain the full array of forest species, we need to maintain the full range of age-stages of the forest (see Box 18), particularly the two youngest (grass-forb and shrub-seedling) and two oldest stages (mature and old-growth).

Of 204 species of mammals, birds, reptiles and amphibians in the Coastal Western Hemlock zone, 17 species (8%) live (are relatively abundant) in only one stage: three species in grass-forb; 12 species in shrub-seedling; one species in young forest; and one species in old-growth. Only three species (1%) live in all six stages.

Box 13. Age-stages (seral stages) of a forest

	APPROXIMATE AGE (YEARS) NATURAL FOREST	MANAGED FOREST	WILDLIFE SPECIES[1] NO.	%
1. Grass-forb:	0-5	0-1	48	24
2. Shrub-seedling:	5-15	1-3	99	49
3. Pole-sapling:	15-30	3-20	31	15
4. Young:	30-75	20-75	63	31
5. Mature:	75-200	75-100/120	140	69
6. Old-growth:	200+	—	151	74

Note:
1. Number and percent of total (204) species that are relatively abundant in particular age-stages of Coastal Western Hemlock forest. Most species live in more than one age-stage.

Sources: Bunnell & others 1991; Bunnell & Kremsater 1990.

2. The guidelines in this action are based on Bunnell & others 1991, who are also the source of all data given.

Most species live in more than one stage. Significantly, 131 species (64%) live in either the two oldest stages, the two youngest stages, or a combination of the both[3]. As shown in Box 13, a managed forest usually has no old-growth stage and the mature and youngest stages are shorter than they are in a natural forest.

To avoid the effects of fragmentation, we need to maintain areas of mature or old-growth forest connected by corridors of forest interior habitat. Also, it is probably desirable that harvest units are in a mixture of sizes, rather than all large or all small.

Many of the 57 species that live in the two oldest age-stages seem to do best in forest interior habitat (in mature forest, interior forest is the area that is more than three tree heights from the edge[4]). These species, and species with large territories, are most likely to be harmed by forest fragmentation. This is because fragmentation usually alters microclimate which in turn changes the habitat. It can also isolate groups of animals, so reducing the effective breeding population.

To find the appropriate mixture of sizes of harvest units, we need know to what extent different age-stages of the forest act as barriers to animal species. We also need to know the species' dispersal abilities and tendencies.

Each of the 219 forest-dwelling wildlife species in the Coastal Western Hemlock zone has different habitat requirements, abilities and tendencies to disperse, responses to potential barriers to dispersal, and tactics for establishing home ranges. Bunnell and his colleagues suggest that it is impractical to treat each species separately, but instead they be examined as groups.

To maintain key habitat for wildlife, we need to protect riparian areas and upland deciduous (broadleaved) stands.

Seventy-two per cent of the wildlife species use riparian areas[5]. Some depend on these areas (Pacific giant salamander, terrestrial garter snake, osprey, harlequin duck, river otter). For others, they may be among the most productive and valuable of a wide range of habitats (western red-backed salamander, tree swallow). For others they may not be important at all (common flicker). The large number of species that use riparian areas is due to the areas' productivity, the plant species that grow there, and the presence of water.

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3. 57 species (28% [18 mammals, 37 birds, 2 amphibians]) live in the two oldest stages; 35 species (17%) in the two youngest stages; and 39 species (19%) in a combination of the two oldest plus two youngest stages. By contrast only two species (1%) live in the middle two stages.
4. In the cool damp climate of Clayoquot Sound interior conditions may begin closer to the edge than this.
5. 55% of amphibians, 67% of reptiles; 78% of mammals, 70% of birds.

The *Coastal Fisheries/Forestry Guidelines* are not intended to, and do not, provide for maintenance of wild species other than fish. So this requirement is in addition to the requirements for protection of fish habitat. Not all riparian areas need to be protected everywhere at the same time.

Eleven per cent (15 species) of the birds depend on upland deciduous stands, because they often prefer hardwoods as sites for nesting cavities, and because of the abundance of particular groups of insects. A mixture of hardwoods and softwoods increases the diversity of habitats and wildlife. Deciduous stands have already been excluded from the productive forest land base (see Chapter 7).

Also to maintain key habitat, we need to retain old-growth characteristics important for wildlife: large live trees; snags; coarse woody debris; structural variety; age; microclimate.

Large live trees: a source of large cavities (many cavity-nesting birds prefer live trees—for example, Barrow's goldeneye, black-backed woodpecker, hooded merganser); nesting sites—large, strong limbs (bald eagle), wide, mossy limbs (marbled murrelet), bark slabs (brown creeper); foraging sites for insect-eating birds; large canopies capable of good snow interception in areas of deep snowfall; roosting sites for several species (bats, bald eagles); and ultimately a source of snags and coarse woody debris.

Snags: nesting and roosting sites (cavities); important food source (wood-boring insects) for many species; roosting and nesting site for eagles and ospreys. Cavities are used by 56 wildlife species (26%), 19 mammals (30%) and 37 birds (27%).

Coarse woody debris, on land and in streams: sheltered areas for a range of wildlife species (salamanders, shrews, river otter); source of food (invertebrates) for many species; essential habitat for amphibians requiring a cooler, moister, more stable microclimate than the surrounding area; increased habitat diversity in streams. Downed wood is used by 42 wildlife species (19%).

Structural variety: more species are likely to be found in an old-growth forest (151 species) than in a mature forest (140 species) than in a young forest (63 species). This is because older forests have greater structural variety than young forests: a multi-layered canopy with more openings and old-growth characteristics (for example, snags), and more understory vegetation. These provide a greater diversity of nesting and foraging sites.

Age: the important features of large, live trees are to some extent due to their age. Many mosses, liverworts and lichens that grow on trees are slow to colonize and develop (more than 50 years), possibly due to their need for slowly shedding and deeply fissured bark (both products of age).

Microclimate: amphibians require cooler, moister sites that result from closed canopies; reptiles require openings where they can receive direct sunlight; some plants that grow on trees, such as lichens, may require the alternate periods of wetting and drying that are common in tall, relatively open canopies.

Leave patches of live trees and snags within the cutblock. These provide a source of large diameter snags for the future forest. They are also an immediate source of nesting habitat and cover for some species. Retaining patches is safer and technically easier than retaining single trees and snags. Bunnell and colleagues provide further guidance on patches[6].

Maintain coarse woody debris (both solid logs and decaying material) wherever it does not interfere with planting. Large diameter material (larger than 40 cm) is preferable, since it provides better foraging habitat and escape cover for small animals, decays more slowly, and is less of a fire hazard. Retain at least 10 large fresh logs per hectare scattered across the site and all decaying logs.

Create structural variety by thinning some areas and leaving others, and by thinning to a mixture of densities; by promoting a mix of tree species, including hardwoods; by retaining patches of brush along streams, on low-productivity microsites, and on the retained patches of live trees and snags. Adopt long rotations for some stands to allow large old trees to develop.

Action 1.3. Adopt management guidelines to conserve the natural diversity of coastal ecosystems.

Similar guidelines need to be developed for Clayoquot Sound's rich array of coastal habitats and the species that rely on them. If possible, the guidelines should include measures to help restore waterfowl numbers.

Waterfowl populations (especially Canada geese, wigeon and mallard) seem to have declined significantly this century. Dabbling duck numbers were 30% lower in 1985 than in 1972 and geese numbers were 25% lower. American wigeon, goldeneye and mallard numbers were lower in 1989 than on previous surveys. Brant geese at Stubb's Island have declined from 4,000 in the late 1970s to 480 in 1989. Wintering brant have drastically declined throughout BC over the last 100 years, and now occur mainly as spring migrants[7].

6. Bunnell & others 1991.
7. Natural Environment study: 26-27.

These declines may be caused by a combination of habitat change and disturbance elsewhere on the flyway and local disturbance, both natural (eagles) and from increased human activity (boats, aircraft). Local hunting could also be a factor but is unlikely to be the main cause of the drop in dabbling duck numbers. Waterfowl hunting success at Tofino has declined about 40% and hunter numbers are down about 50%. Overall a 75% reduction in duck harvest has occurred in the Tofino area. Some 80% of the harvest is taken by local hunters[8].

8. Natural Environment study: 27.

7. FORESTS AND TIMBER PRODUCTION

Forests—both old-growth and second-growth—have several essential functions. They supply timber, and provide resources for fisheries and tourism. They influence global and local climates by storing carbon and intercepting moisture. They help to regulate the local hydrological cycle, protecting soils from excessive erosion, reducing the silt loads of rivers, and slowing runoff. They support a great variety of wild animals and plants. They are beautiful and an important part of the cultural and spiritual lives of Natives and non-Natives.

In 1991[1], the timber sector in the Alberni-Clayoquot Regional District contributed $487 million a year to the BC economy. About $136 million of this stayed in the region—$93 million as take-home pay; $33 million in payments for goods and services; $5 million in municipal taxes; and $5 million in expenditures by the Ministry of Forests district office. The sector directly employed an estimated 4,272 people in the region: 1,667 in woods operations, 1,145 in wood industries (mills), and 1,460 in pulp and paper.

An estimated 1,404 workers in the Regional District (one third of the workforce) depend on harvesting in Clayoquot Sound: 548 in woods operations, 376 in wood processing (mills), and 480 in pulp and paper. Of the 548 in woods operations, 384 are employed directly or indirectly by MacMillan Bloedel; 82 by Fletcher Challenge Canada; 60 by Canadian Pacific Forest Products; and 22 by small business sales[2]. Many live in the Ucluelet area. A few, mostly associated with small business sales, live in Tofino. The rest live in Alberni Valley; and some may live outside the Regional District.

In addition, a number of small producers operate in Clayoquot Sound: how many they employ and where they get their wood has not yet been determined. For example, 30 shake cutters work on MacMillan Bloedel tenures in Clayoquot Sound: 2 live in Tofino; 25 live elsewhere in the Regional District; 3 live outside the Regional District.

There are an estimated 149,096 hectares of productive forest land in Clayoquot Sound. Productive forest land is land that is available for growing an economic crop of timber. Appendix 6 explains how this has been estimated. The Steering Committee may recalculate this area in the course of developing the Strategy.

The productive forest land base currently contains an inventory of 94 million cubic metres of timber. At present, this is managed in a patchwork of land parcels as part of three larger forest management units—Tree Farm Licence (TFL) 44 (MacMillan Bloedel), TFL 46 (Fletcher Challenge Canada), and the Arrowsmith Timber Supply (Ministry of Forests). Box 14 shows how the forest land base and mature timber inventory in Clayoquot Sound is distributed by management unit.

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1. Based on 1989 data from Simons (1990), adjusted for closure of the Port Alberni plywood mill, and converted to 1991 dollars.
2. Timber study: 10-11.

Box 14. Distribution of the forest land base and mature timber inventory in Clayoquot Sound by management unit

MANAGEMENT UNIT	TOTAL FOREST LAND		PRODUCTIVE FOREST LAND			MATURE TIMBER INVENTORY	
	Area (ha)	% of total	Area (ha)	% of total prod. forest	% of total forest land	Volume 000^3	% of total
TFL 44: MB	136,151	65	100,595	67	48	65,806	70
TFL 46: FCC	51,076	24	38,322	26	18	23,722	25
Arrowsmith TSA, Forest Licences, SBFEP Timber Sales	22,492	11	10,179	7	5	4,482	5
TOTAL	209,289	100	149,096	100	71	94,010	100

Sources: Timber study.
Ministry of Forests Small Business Forest Enterprise TFL 46 Landbase Takeback Agreement, 20 September 1991.

Note: TFL 44 areas and volume include 5% SBFEP Crown Timber takeback (takeback volume not deducted from the landbase). TFL 46 areas and volume exclude 5% SBFEP Crown Timber takeback (takeback volume deducted from the landbase).

The annual timber harvest (in terms of scaled volume) in Clayoquot Sound averaged 914,501 cubic metres from 1985 through 1989, and was 767,230 cubic metres in 1990 (see Box 15).

All of the wood harvested by Fletcher Challenge Canada and Canadian Pacific Forest Products is processed outside the region. MacMillan Bloedel sends some of the wood it harvests outside the region, but also brings in wood from outside. Most of the wood going out is redcedar, yellow-cedar (cypress) and Douglas-fir. The company estimates that the net amount that left TFL 44 during 1989 and 1990 was 208,000 cubic metres a year, or 8% of average production. If the proportion is the same for Clayoquot Sound, then between 40,000 and 42,000 cubic metres of timber harvested by MacMillan Bloedel in Clayoquot Sound leaves the region. Until 1991, about half of the wood harvested by the small business sales, was processed outside the region; in 1991, all of it left the region.

Box 15. Clayoquot Sound timber volumes scaled (cubic metres)

	1985	1986	1987	1988	1989	ave. 1985-89	1990
MB: TFL 44	475,526	350,512	442,487	536,755	553,141	471,684	518,963
MB: TO846	117,286	28,669	939	20,389	0	33,457	848
MB: total	592,812	379,181	443,426	557,114	553,141	505,141	519,811
FCC: TFL 46	226,727	185,027	187,168	230,589	219,494	209,801	150,908
CPFP: TO197 & 295	167,667	136,546	195,931	138,849	152,668	158,332	89,565
Andreef: TO807	27,425	0	0	0	0	5,485	0
SB Timber Sales	0	631	0	248	32,732	6,722	6,946
TOTAL	1,014,631	701,385	826,525	926,830	958,035	885,481	767,230

Source: Ministry of Forests, Port Alberni, 26 September 1991

To summarize, of the 767,230 cubic metres harvested in Clayoquot Sound in 1990, about 480,000 cubic metres (63%) were processed in Alberni-Clayoquot; about 20,000-30,000 cubic metres (3%-4%) were processed in Clayoquot Sound [exact figures to be obtained]. Most of Clayoquot Sound's forests are old-growth. About 85% of the productive forest land is older than 120 years. In general, the small amount of second-growth forest will not be harvestable for at least 50 years. If no old-growth stands were cut, harvesting would stop.

Goal

The goal of this part of the Clayoquot Sound Sustainable Development Strategy is to conserve the range of forest values and develop uses of the forests that are sustainable. This requires:

Providing reliable and rewarding employment for people in the timber industry and other industries that rely on forests.

Making these industries more competitive and economically viable.

Ensuring that these industries coexist equitably with each other.

Providing a secure and sustainable supply of fibre.

Providing a secure and sustainable supply of other forest resources.

Maintaining air quality, the health of the atmosphere, water quality, the variety and integrity of ecosystems, the habitat of fish and other wild animals, and the diversity of species and genetic stocks.

Action 2.1 Ensure that all timber harvesting is sustainable.

This is a matter of designing timber harvest levels and practices to achieve several different objectives:

- Production of a sustainable supply of timber.
- Maintenance of water quality and normal rates of flow.
- Protection of fish and wildlife habitat.
- Maintenance of scenic values for residents and the tourism industry.
- Conservation of the variety and integrity of ecosystems and the diversity of species and genetic stocks.

There is a range of potentially sustainable harvest rates, not just one. If the aim is to maintain old-growth forests in their natural state, harvesting would have to have no more impact than traditional harvesting by Natives: bark stripping and the removal of occasional trees using no roads. This would be equivalent to the natural turnover of trees in an old-growth forest.

If the aim is to convert old-growth forest to second-growth and to harvest the second-growth forest on a sustained yield basis, sustainable harvests can be substantially higher. This is the aim of current forest policy in BC.

If the aim is to obtain the maximum sustainable yield of fibre over time, then second-growth trees are harvested when they are making their highest rate of growth (maximum mean annual increment). This is called the Long-Run Sustained Yield (LRSY). The period during which the annual growth rate is within 95% of the maximum is usually many years. For western hemlock on medium quality sites (site index 24) it is between ages 75 and 120. This provides for plenty of flexibility in choosing the best time to harvest. Possible management options in order of decreasing LRSY are:

1. Cultivated forest (plantation), harvested on 75-120 year rotation.

2. Modified forest, harvested on 75-120 rotation

3. Modified forest, harvested on a mixture of rotations (say 50% 200-250 year, 50% 75-120 year).

4. Modified forest, harvested on 200-250 year rotation.

5. Natural (old-growth) forest.

Please see Box 16 for an explanation of the natural/modified/ cultivated classification.

Box 16. Main conditions of forest lands

NATURAL FOREST. Old-growth forest. Forest where trees have never been cut down by people or where for the past 250 years only a few trees have been felled occasionally using no roads.

MODIFIED FOREST. Forest where trees have been felled during the past 250 years, and that retain a tree or shrub cover of native species. New tree growth may come from natural regeneration, planting of native species, or both; but silviculture is limited to planting and spacing. Modified forest includes a wide range of conditions. For simplicity, it can be divided into two types: forests in which fibre production is the primary objective; forests in which fibre production is a secondary objective.

CULTIVATED FOREST. Forest subject to intensive silviculture (fertilizing, pruning, thinning) or planted with non-native species.

DEGRADED FOREST. Forest land whose and productivity and diversity have been so reduced that they are unlikely to recover to original levels without rehabilitation or restoration measures.

All options except the last would involve the conversion of natural forests to modified forests. However, as you go down the list, the point at which a second harvest is made gets later and the proportion of forest with old-growth characteristics increases.

The Timber study estimated the LRSY of Clayoquot Sound to be 815,000-823,000 cubic metres a year, on the basis of the second of the above options. The allowable annual cut (AAC) would be higher than this—920,000 cubic metres a year. This rate of cut would completely remove old-growth forest from the productive forest land base by about 2091 and replace it with second-growth forest. Old-growth would remain in places that have been specifically set aside, such as riparian zones, "environmentally sensitive areas", and unproductive sites. About 75% of the second-growth forest would be 1-80 years old and the remaining 25% would be 81-140 years old.

The Timber study assumed that all the productive forest will be managed according to current silvicultural practice. This is the creation of a mosaic of even-aged stands through clearcutting.

Basically, there are two kinds of silvicultural system: even-aged and uneven-aged. In an even-aged system, harvesting is always by clearcutting, with the cuts anything from a hectare in size upwards. Regeneration may be from seed that is already on site; from seed trees that are left standing; by planting; or a combination of planting and natural regeneration. The larger the clearcut the more necessary planting is likely to be. The result is a stand of trees of a hectare or more (depending on the size of the clearcut) that are about the same age.

A variant of clearcutting is strip cutting, in which harvesting is done in narrow strips. Regeneration is usually entirely natural. Another variant is the shelterwood system, in which harvesting is designed to produce two or more distinct crown levels representing two or more age-classes.

Uneven-aged systems are intended to maintain the full range of age-classes within a cutting area. They fall into two main types:

> Single tree selection. Individual large trees and smaller trees are harvested to maintain a particular combination of ages and sizes.
>
> Group selection. Small groups of trees of similar age and size are harvested at the same time, producing small even-aged patches.

"New Forestry" methods, which are designed to ensure that modified forests have much of the structural, functional, and species diversity of old-growth forests, are variants of these two kinds of system. Uneven-aged methods are basically the same. "New Forestry" even-aged methods are clearcuts with varying proportions of trees left standing[3]:

> Light conifer retention. A clearcut with small groups of green trees and snags left standing.
>
> Moderate conifer retention. A clearcut with seed trees left standing.
>
> Heavy conifer retention. Most of the trees in a stand are harvested. Trees left standing are either (a) dispersed uniformly across the harvested area; or (b) left in groups.

The effectiveness of "New Forestry" methods is not known.

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3. Hopwood 1991.

No silvicultural system is ideal for all purposes. A system that will produce the most fibre is likely to sacrifice many other values. Even-aged management can produce a forest that is more like a plantation than the natural forest it replaced. This is inevitable, if clearcuts are large and regeneration is by planting.

The pattern of renewal of a managed forest is very different from that of a natural forest: the early shrubby stages do not last as long; and the long, structurally diverse old-growth stage is eliminated. Many wildlife species are best adapted to the shortened or missing stages. Many species use large green trees (older than 120 years), downed wood (coarse woody debris) or snags as their primary breeding habitat.

Making sure that clearcuts are no bigger than 16 hectares has been proposed to ensure plenty of habitat for birds that eat forest-pests[4]. But the pattern of small clearcuts that has fragmented the forests of Washington and Oregon has been blamed for reducing biodiversity.

Some of the "New Forestry" systems look messy and so are unlikely to be any more attractive to tourists than the clearcuts they are intended to improve.
Uneven-aged management system require more frequent harvesting operations and more roads, so damaging soils and increasing erosion. They can also be more dangerous for forest workers.

Because no one silvicultural system can achieve all of the objectives stated at the beginning of this action, we must assume that several systems will be used in an area the size of Clayoquot Sound. It is a mistake to assume that all harvesting will be clearcutting, just as it would be a mistake to assume that it will all be single tree selection.

In other words, to achieve the different objectives set out at the beginning of this action, we have two options. One is to try and achieve them all in every watershed. The other is to allocate watersheds to different objectives.

Some options are easier to combine than others. It should be possible to combine production of a sustainable supply of timber, maintenance of water quality and normal rates of flow, and protection of fish habitat. Protection of scenic values for residents and the tourism industry, and conservation of the variety and integrity of ecosystems and the diversity of species and genetic stocks, are more difficult to combine with an economic supply of fibre.

If we try to protect all values in every watershed, we could end up with the worst of all worlds: forests that are less diverse, support fewer resource users, and produce less timber.

4. Langelier & Garton 1986.

To ensure that all forest uses are sustainable, the Strategy could include a zoning system, designed to meet all forest objectives in Clayoquot Sound as a whole but not necessarily in every watershed. Practical management units should be adopted, probably based on watersheds or groups of watersheds.

Timber inventories for Clayoquot Sound should be recalculated, using major watersheds or equivalent areas as the basic inventory unit, and taking account of any other resources and values in accordance with criteria to be agreed (see Chapter 11).

All proposals for silvicultural systems in Clayoquot Sound should come under the jurisdiction of the Steering Committee so that they can be integrated into the Strategy.

Action 2.2 Establish a baseline monitoring area and an experimental forest in Clayoquot Sound.

This need for baseline monitoring applies to all environments and resource uses, not just forests and timber production. It is dealt with here because timber production has the biggest impact on the ecosystems of the coast. Also, ensuring that forest use is sustainable is among the most difficult and complex of the challenges of sustainable development—most in need of a much stronger base of knowledge.

Sustainable development calls for three kinds of environmental monitoring:

> State-of-the-environment monitoring. Keeping track of (1) the current condition of ecosystems and species; (2) human impacts on ecosystems and species; (3) actions to reduce or remedy impacts.
>
> Experimental monitoring. "What if" monitoring. Finding out how ecosystems and species respond to particular stresses. Carnation Creek is an example.
>
> Baseline monitoring. Measuring and understanding the natural condition of ecosystems and species. This provides a context and benchmark for the other two kinds of monitoring. It is needed to measure rates of environmental change, improve understanding of natural systems and the effects of human activities, and assess the sustainability of resource uses.

Criteria for an experimental forest. The forest should:

> Be typical of a widespread forest and watershed type (in terms of forest cover types, site quality classes, form of the watershed).
>
> Be representative of a forest or watershed type not already covered by an existing experiment. For example, it should be a different watershed type than Carnation Creek.

Most Clayoquot Sound watersheds qualify.

Not include any unique or rare habitats or depleted populations that might be destroyed or seriously degraded or threatened by an experiment.

Experimental forests are a long term commitment. They must be set up for the long term: 200 years or more. Therefore there cannot be very many of them. Experimental forests will produce harvests of timber and therefore can be expected to employ workers in the industry.

Criteria for a baseline monitoring area. The area should:

Be a natural (unmodified, undisturbed) ecosystem.

Be as protected as possible from outside influences. This means that it should be large and consist of one or more intact watersheds.

Represent as many biogeoclimatic units as possible. This can be achieved by covering an elevational gradient.

In at least one site, be a primary watershed to capture the marine/freshwater interface.
Ideally, because of the diversity of BC's environments, there would be a baseline monitoring area in every ecoregion (30). But this is not practical. Instead, there should be a baseline monitoring area in every ecoprovince (10) or biogeoclimatic zone (up to 14). Baseline monitoring areas could be ecological reserves, provincial parks or national parks.

Action 2.3 Develop a plan to improve the competitiveness of the timber industry and ensure a smooth transition to sustainability.

This action is not developed here, due to lack of information. It will be developed over the coming months as part of the Strategy.

Jobs and income in the timber sector are declining quite independently of changes in the size of the land base or the AAC. Sustainable development in Clayoquot Sound could reduce the land base or the LRSY. Conversely, it could increase the LRSY through improved silviculture.

Once we agree on what is sustainable, we must agree on a plan to get from here to there with minimum disruption. Any transition to sustainability must be carefully managed to minimize, and preferably avoid, any harm to people's lives. The AAC can be set at levels that will help to do this.

A long term aim is to provide greater security for the industry by making it ecologically sustainable as well as more viable economically. We will try to find ways of enabling the industry to contribute to community stability and provide new economic opportunities.

One of the requirements for economic viability is a secure land base. Taking account of the need to maintain environmental quality and protect other resource values, the industry needs areas of economically accessible and operable forest—especially medium- and good-quality sites—to be secured as working forest.

There is scope for job creation. We can get more jobs per unit of wood harvested. But if we do, the cost of the wood will go up and our competitiveness will decline unless we convert the timber to higher value products and sell more of them.

As much as possible of the value of wood harvested in the region should be retained in the region. We should explore the implications and potential of incentives to companies that guarantee that the wood they harvest will be processed in the region. One possible incentive might be to give preference to such companies in the allocation of harvest rights.

The number of additional jobs that could be provided by improved silviculture is directly related to the amount of land that is logged. Old-growth does not need "managing". Also, increasing the number of jobs in silviculture requires expanding the area of cultivated forest, since that is where intensive silviculture is carried out.

The cost of improved silviculture is a necessary part of the management of a cultivated forest. It should be recovered from the increases in yields, quality or both, brought about by silviculture. We need to work out a fair way of sharing the costs and benefits of improved silviculture.

Ministry of Forests policies that reduce the economic efficiency of the industry but are not necessary to protect other forest values should be changed. Examples may be the cut control policy ("use it or lose it") and the zero waste tolerance policy. Both force supply onto the market regardless of demand, depressing prices and income from stumpage. The appraisal policy must also be changed. This sets stumpage as the value of wood minus the cost of logging, but requires that the cost of logging be based on the cheapest method that is physically possible. This penalizes a company that adopts more expensive methods with the aim of protecting environmental values or the resources of other industries (such as fish habitat).

8. FISHERIES AND AQUACULTURE

Fisheries, aquaculture and seafood processing in the Clayoquot Sound area (Area 24) generated an estimated $27.5 million of gross income in 1990. Almost $15 million of this came from fishing, $11 million from aquaculture, and the rest from processing[1].

Fishing, aquaculture and processing in Clayoquot Sound support the equivalent of 343 full time jobs, an estimated 146 in fishing (including shellfish harvesting), 120 in aquaculture, and 77 in processing[2].

Fishing is the economic and cultural mainstay of the Nuu-chah-nulth communities of Clayoquot Sound. In addition, sport fishing is a major part of the tourism industry in the area.

Clayoquot Sound (Area 24) accounts for about 40% of the value of fisheries production in the Regional District (Areas 23 and 24), more than three-quarters of the value of aquaculture production, but less than a quarter of the value of processing[3].

Perhaps about $6 million of the fisheries landings comes from fish and shellfish whose habitats are in Clayoquot Sound. Several of these stocks have seriously declined and there is concern about the status of others.

Goal

The goal of this part of the Clayoquot Sound Sustainable Development Strategy is to develop sustainable fisheries and aquaculture. Fisheries and aquaculture will be sustainable when they:

> Are within the carrying capacity of the stocks and ecosystems concerned. Maintain air quality, the health of the atmosphere, water quality, the variety and integrity of ecosystems, and the diversity of species.
>
> Provide a secure and sustainable supply of high quality food and other resources, particularly for Nuu-chah-nulth communities.
>
> Provide the basis for aboriginal and non-aboriginal cultural values and lifestyles, including reliable and rewarding employment for people in the industries. Coexist equitably with each other and with other resource industries.

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1. Fisheries & Aquaculture study: 19.
2. Fisheries & Aquaculture study: 19.
3. Fisheries & Aquaculture study: 20. Data from different years: fisheries 1990; aquaculture 1989; processing 1990.

Fisheries

Canadians have a stake in the aquatic resources of Clayoquot Sound. In particular, fishing is an important part of the lifestyle of Tofino, Ucluelet, and the Nuu-chah-nulth. People who live by fishing feel strongly that dollars do not come close to expressing the value of their way of life.

Some salmon and shellfish stocks are depleted. Restoring them and improving their management will increase the economic and other benefits from them.
Some species are resident year-round in Clayoquot Sound—for example, crabs, clams, sea urchins, gooseneck barnacles—so local harvesting can be matched closely to local production. Others, such as local stocks of salmon, originate in Clayoquot Sound and migrate outside Area 24. Still others—for example, non-local salmon stocks—pass through Area 24. Enforcement of management decisions concerning these migratory or highly mobile species is particularly difficult, because the species may be harvested by people in several jurisdictions.

Action 3.1 Restore and maintain salmon and trout stocks.

Escapement data (information on the number of fish that return to their natal streams to spawn) for the four main salmon species except perhaps chum are not as reliable as they should be. But five-year averages that iron out year-to-year fluctuations show clearly that the four main species in Clayoquot Sound have declined (see Box 17). However, demand for salmon—by the commercial, aboriginal, and recreational fisheries—has if anything gone up.

The causes of the declines are not known. Overfishing is one likely cause. For example, it is estimated that chinook harvest rates were 15% above sustainable levels prior to the Pacific Salmon Treaty[4]. There is evidence that logging has been a factor in certain cases. For example, a fisheries report states that "1973 logging ruined creeks along the NW shore of Kanim Lake—very little gravel remains in these creeks"[5]. However, declines have also occurred in watersheds where there has been no logging at all.

4. Pacific Salmon Commission, Chinook Technical Committee.
5. Brown & others 1979.

Box 17. Average annual escapements of four salmon species to Clayoquot Sound (Area 24)

	CHUM	SOCKEYE	COHO	CHINOOK
1950-54	86,375	47,565	16,195	5,360
1955-59	53,205	54,550	21,530	5,935
1960-64	35,390	46,820	16,404	2,557
1965-69	36,981	15,109	11,268	991
1970-74	58,290	24,985	11,210	605
1975-79	59,257	31,690	5,704	393
1980-84	61,883	30,481	2,422	297
1985-89	22,434	22,434	5,236	316

Source: Department of Fisheries and Oceans (under review)

The failure of the stocks to recover may be due to a combination of fishing pressure, habitat degradation, environmental change, natural predation, and other factors, but this has not been verified.

Conservation measures include international and national allocations, quotas, and restricted fishing seasons and areas, in accordance with the Pacific Salmon Treaty. Habitat protection is being improved through the *Coastal Fisheries/Forestry Guidelines*.

Small stream systems are important producers of coastal cutthroat and coho salmon. Small populations of chum salmon are found in the lower reaches of many streams near tidewater. The other species are less widespread. Sockeye salmon usually occur in stream systems with lakes. Chinook salmon generally are found in large mainstem river systems. Dolly Varden are also noted only from the larger rivers (Megin, Clayoquot, Kennedy)[6]. Pink salmon are present in very low numbers. For the time being, there seems to be no prospect for the development of a commercial pink fishery[7].

Chum

The commercial fishery for chum inside Clayoquot Sound ceased in 1982. The outside troll fishery in Area 24 is small. Chum make up about half of the aboriginal fishery, taken in inlets and at creek mouths. The streams targeted by the fishery support relatively large runs, which until recently have shown no sign of pressure[8].

6. Natural Environment study: 34.
7. Fisheries & Aquaculture study: 46.
8. Fisheries & Aquaculture study: 48.

Chum use a great many of Clayoquot Sound's streams. Escapement data for chum salmon are fairly reliable. Assessing chum escapement is relatively easy because the spawning areas are in the lower reaches of streams and are accessible by boat rather than by road or aircraft, and the numbers of spawners can be counted visually[9]. Chum stocks were believed to be rebuilding but now seem to be in trouble. Escapements fluctuate a lot, but after 1982 fell sharply and have exceeded 30,000 only once since then. The current target of 80,000 spawners has been achieved only eight times since 1950 and will be reevaluated. Chum escapements seem to fluctuate between periods of high and low abundance, so it may be better to change the target from period to period or year to year.

The cause of the current low numbers are not known. It is probably a combination of habitat disturbance by logging and fishing pressure. Chum are easily poached in fall when they gather in river mouths. The rate of interception by fisheries is unknown, and could be determined by tagging. DFO is currently evaluating chum stocks in the area[10].

Sockeye

In Area 24 there has been no commercial net fishery targeting on sockeye since 1971; and the troll fishery is likely to intercept very few Clayoquot Sound sockeye since most have entered the Sound by early August[11]. There is an aboriginal fishery at the mouth of the Megin River, but there has been none on the Kennedy since 1987. The impact of poaching is not known but may be substantial. The aboriginal fishery outside the surf line harvests stocks from outside Clayoquot Sound (for example, Fraser River).

Accurate escapement data are difficult to obtain because they are based on visual estimates, which are difficult to do accurately with lake spawning fish.

Escapements of sockeye to the Kennedy system, which accounts for more than 95% of the area's production, have usually been below 30,000 a year for the last 20 years, compared to the current target of 120,000. Consequently there has been no recent fishery targeting Kennedy sockeye[12].

An enrichment program aimed at increasing the food supplies for fry has not restored the stock. The reasons for this are not known. Logging has occurred in the Kennedy River watershed, which may have increased natural fluctuations in the water level of Kennedy Lake. There has been no logging in the Clayoquot River watershed. Other factors may be predation by other animals and competition by sticklebacks for food[13].

Three runs of Kennedy Lake sockeye seem to be reproductively separated: early tributary spawners (migrating into the Kennedy system in June); later tributary spawners (migrating

9. Natural Environment study: 35.
10. Fisheries & Aquaculture study: 48.
11. Fisheries & Aquaculture study: 25.
12. Fisheries & Aquaculture study: 25; Canada Department of Fisheries and Oceans 1987.
13. Fisheries & Aquaculture study: 25-26.

into the system in August/September); and lake beach spawners. In turn these seem to be distinct from sockeye in the adjacent Muriel Lake[14].

Coho

We don't know how much of the commercial coho catch in Area 24 (an outside troll fishery) originates from Clayoquot Sound streams. Recreational and aboriginal fisheries take coho both inside and outside the surf line, but a greater proportion of the fish may originate in Clayoquot Sound.

Distant commercial, troll, aboriginal and recreational fisheries all have an impact on coho stocks. The Pacific Salmon Treaty has set a ceiling of 1.8 million on commercial fisheries for coho off the west coast of Vancouver Island. Recreational fisheries are subject to catch limits and terminal area closures but not to an overall catch ceiling; and there is no ceiling on the aboriginal fishery. The Canadian and US Governments are evaluating more effective approaches to rebuilding coho stocks.

Coho escapements are difficult to monitor because they spawn late in the year when water clarity is low and they are often dispersed throughout a stream system. Estimates are therefore highly unreliable, but seem to have dropped from an average of 15,000 a year in the early 1960s to an average of 5,000 a year in the 1980s. It should be noted that, until the mid-1980s, estimates were made for stream systems that were not visited. Since then, estimates have been made only for streams actually visited.

Declines seem to have occurred in watersheds with logging (Cypre River, Hesquiat Harbour, Kanim Lake, Kennedy River, Kootowis Creek) and in watersheds without logging (Megin River, Moyeha River). Carnation Creek data show that habitat disturbance by logging, sustained high exploitation, and adverse oceanic and climatic conditions are the main factors affecting escapement[15].

Chinook

Chinook stocks collapsed in the early 1960s and have stayed in the hundreds since 1970. The populations are small enough to qualify as endangered. Because the numbers are so low, all three fisheries—commercial, aboriginal, and recreational—could be preventing their recovery. A tag recovery study is required to determine this. It is estimated that 70% of the catch of chinook from the west coast of Vancouver Island is taken in the Gulf of Alaska[16].

The Pacific Salmon Treaty imposed catch ceilings on many of the fisheries that affect Clayoquot Sound stocks. The target catch reduction of 15% has not been achieved, and

14. Natural Environment study: 35.
15. Fisheries & Aquaculture study: 44.
16. Pacific Salmon Commission, Chinook Technical Committee.

now appears to be insufficient. Additional restrictions may be required to rebuild wild chinook stocks. Recreational fisheries have no overall limit but are subject to local closures and individual bag limits.

Other species

With tourism development in Clayoquot Sound, there will be increasing pressure on stocks of steelhead, cutthroat, rainbow, and Dolly Varden. The size of the current recreational fishery and its impact on local stocks are not known.

Enhancement efforts in Clayoquot Sound

The Tofino Salmon Enhancement Society has completed a new hatchery in Tofino with a capacity to incubate 500,000 eggs and rear 250,000 fry. The Tla-o-qui-aht First Nations operate a hatchery for chinook salmon on the Kennedy River. It currently produces 250,000 fry, and is expected to produce 400,000 a year by 1993. Using its hatchery near Ucluelet, the Thornton Creek Enhancement Society has a major role in enhancing Clayoquot Sound fish, including Kootowis Creek, Kennedy River, Clayoquot River, Tranquil Creek, Bedwell River, and Cypre River. Thanks to these voluntary efforts—funded both privately and with federal and provincial government support—it is expected that one million healthy fry will be released into Clayoquot Sound rivers in 1993[17]. The Ahousaht Band school incubates chum eggs from Atleo River and coho eggs from Cow Creek.

DFO fertilized Clayoquot Arm of Kennedy Lake every year from 1978 through 1986 and the Main Arm of Kennedy Lake in 1979, 1980 and 1987[18]. Fertilization has continued in some part of the lake since then. The results have been disappointing. The program should be reviewed.

Recommended action

Restoration of salmon stocks will depend on a combination of enhancement, control of the fishery, and restoring and protecting spawning habitat. Protecting habitat will require scrupulous application of the Coastal Fish Forestry Guidelines, which are currently being revised. Additional site-specific actions may also be required.

There are basically two possible enhancement strategies. One is to help wild stocks reach the maximum natural production capacity of their native streams. The other is to produce as many fish as possible, generally by concentrating on a few major facilities such as the Robertson Creek hatchery. Enhancement effort on Vancouver Island has largely followed the latter course. The success of this strategy—which has helped to restore overall salmon production to historical levels—has masked the dismal state of local wild populations such

17. Whitey Bernard, Tofino, submission. Dan Edwards, Ucluelet, personal communication.
18. Canada Department of Fisheries and Oceans 1987.

as those of Clayoquot Sound.

Since so much effort has been put into large projects, a case can be made for making a complementary effort into rebuilding the local wild populations. They are likely to be genetically adapted to local conditions, which could be important for the long term future of salmon in the region. Efforts to rebuild wild stocks should not try to enhance them beyond the natural production capacity of their native stream. Therefore, they should begin with proper assessments of the stream's production capacity and current smolt production. If production is close to capacity, then the stock does not need to be enhanced.

It is recommended that the Tofino Salmon Enhancement Society, Thornton Creek Enhancement Society, and the Nuu-chah-nulth bands in Clayoquot Sound, in cooperation with DFO, prepare an enhancement plan and budget. This should concentrate initially on the most productive streams, and include an assessment of their production capacity. If necessary, funding for the plan could come from a surcharge on commercial and sport fishing. There is wide support for this[19].

Various opportunities for enhancement should be considered. For example, a project has been proposed for fish farmers to rear local wild stocks of chinook salmon in pens. This could speed the recovery of these seriously reduced populations by improving the survival of fry to adults, thereby providing a bigger supply of eggs that could be reared for planting out to wild rivers. It would also provide an opportunity for fish farmers to test the qualities of local salmon stocks.

Except for the Kennedy River, Tranquil Creek and Cypre River stocks which are semi-wild, Clayoquot Sound chinook are truly wild (their numbers have not been supplemented by hatchery bred fish). They may also represent a unique gene pool. This needs to be determined. A recovery program should be undertaken urgently throughout the Sound, focussing initially on those streams where they are most abundant (Kennedy River, Megin River, Watta Creek, Cypre River, Tranquil Creek).

The reasons why sockeye recovery has been so poor in the Kennedy system needs further investigation.

Control of salmon fisheries will depend in part on getting more accurate information on local and distant harvests of Clayoquot Sound salmon stocks, especially sockeye, coho and chinook. A survey is needed of the local commercial, sport and aboriginal fisheries. A tagging or similar program is needed to obtain better data on harvesting of local salmon in distant waters.

Targets for habitat protection or restoration (as applicable) should be defined for each watershed in Clayoquot Sound. It will be the responsibility of all forest users to conform with the targets, including the Coastal Fish/Forestry Guidelines. Better monitoring of compliance is needed.

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19. Summary of Community Values Surveys: 21-22.

Escapement and exploitation rate studies are needed on steelhead, cutthroat, rainbow, and Dolly Varden. The fisheries should be developed conservatively.

Action 3.2 Protect herring spawning habitat, and assess the impact of herring harvesting on the food chain.

Clayoquot Sound herring support an important fishery and are a major source of food for many other marine animals. Herring spawning habitat should be kept in its natural state and protected from pollution. The main areas are:

Vargas/Meares Island: Maurus Channel, Calmus Passage, Epper Passage, Richie Bay, Cypress Bay.
Millar Channel/Whitepine Cove: Whitepine Cove, Bawden Bay, Matilda Inlet.
Sydney Inlet/Hot Springs Cove: Hot Springs Cove, Hootla Kootla to Riley Cove.
Hesquiat Harbour.
Bedwell Sound (Bare Bluff)/Mosquito Harbour.

From one perspective, the fishery is well managed. Herring numbers fluctuate so they are difficult to assess, but they seem to be within the normal range. However, there is concern about the impact of current harvest levels on other species in the food chain

More thought should be given to the best method of harvesting herring. It has been argued that gill netting catches the bigger animals, whereas seining catches all the spawners, presumably having a heavier impact on the rest of the food chain. Impoundment has been suggested as a way of better controlling the herring roe fishery. Currently, the fishery is opened for a very short time when roe production is judged to be at its peak. The sudden burst of fishing is hard to regulate. The fish could be taken in a more controlled fashion, if each allocation were caught in advance of peak roe production, and held in a pen until the roe were ready. Ponding for spawn on kelp should be done in consultation with other user groups.

At this time the key actions are to protect herring spawning habitat; and to get a better understanding of the ecological importance of herring and the impact of harvesting on the rest of the food chain. Hesquiat Harbour has been suggested as a research area for such an investigation. A cooperative research project has begun with the Hesquiaht Band under DFO's Tribal Cooperative Research Program.

Action 3.3 Ensure the sustainability of fisheries for shellfish.

There are 72 identified geoduck beds in Area 24. The quota for the Area has been reduced from about 2% to about 0.75% of the estimated biomass and divided into six different zones to disperse fishing effort. Geoduck harvesting involves disrupting large amounts of sea bed to expose the clams. To determine the full sustainability of the fishery, reliable information is needed on the size and rate of recruitment of the commercially accessible stock; and the impact of harvesting on benthic (bottom-dwelling) communities.

Population densities of clams seem to be declining and older year classes are disappearing. Studies are under way, but a comprehensive review is needed to determine the status of the stocks. Better information is also needed on population sizes and densities, recruitment rates in relation to year class abundance and biophysical conditions, and competition among species[20]. Alternative management strategies need to be tested.

An assessment of the sea urchin, sea cucumber and gooseneck barnacle fisheries should be undertaken to find out the size and condition of accessible stocks and the size of the harvests. Sea cucumber harvesting is now managed to rotate from Area to Area: Area 24 was closed in 1991. Longer term studies on recruitment and growth rates of these species are also needed.

It has been suggested that the size limit for crabs be increased from 6.5 inches to 7 inches. This could increase (possibly double) the landed value of the fishery, because the crabs would increase from about 1.5 pounds to about 2.5 pounds. It would also expand the breeding population, by adding to the number of males big enough to mate with the current stock of large females. Increasing the size limit in Clayoquot Sound is practicable because it is the only place on the coast with a limited number of pots. The increase could be phased in over two years (a quarter inch a year).

Action 3.4 Review the sustainability of other fisheries.

Lingcod stocks are declining on the west coast of Vancouver Island. Some rockfishes mature slowly. Accordingly, there is some question about the sustainability of both fisheries.

Aquaculture

Finfish culture

Finfish aquaculture is growing rapidly, from 742 tonnes in 1988 to 2,220 tonnes in 1990 (and a projected 6,000 tonnes in 1991). The maximum licensed production at present is 7,420 tonnes a year. Chinook salmon account for virtually all of this. Small amounts of steelhead trout (about 1% of 1990 production) and Atlantic salmon (about 2.5% of 1991 production) are also grown. About 20 fish farms are operating out of 28 sites tenured by the Ministry of Crown Lands. Most are in Tofino Inlet, Outer Bedwell Sound/Cypress Bay, and Fortune Channel.

Action 3.5 Place a ceiling on the expansion of fish farming.

Expansion of fish farming in Clayoquot Sound is currently limited by guidelines that fish farms be at least three kilometres apart, one nautical mile (1.85 kilometres) from "important" herring spawning areas, and one kilometre from Indian Reserves, the mouths of salmon spawning streams, and parks. Another key limitation is the biophysical

20. Fisheries & Aquaculture study: 61-62.

capability of the water body to support a productive fish farm. The maximum number of sites in Clayoquot Sound that could comply with these limitations is 49.

Together, these restrictions go a long way towards ensuring that fish farms do not transform the water bodies of Clayoquot Sound from natural/modified ecosystems into cultivated ecosystems. It is important for the long term sustainability of the area that some water bodies remain in as natural a condition as possible. These include all the fast flowing narrows (because of their uniqueness and high diversity) and at least one each of the other types of water body (to provide a benchmark against which the long term impacts of fish farming can be assessed).

The effect of this policy would be to prevent farms from being established in Sydney Inlet (the only fjord without fish farms), and Duffin Passage, Tsapee Narrows, Dawley Passage, Matleset Narrows, and Hayden Passage (narrows with fast tidal currents). This would reduce potential additional production by three farms (two in Sydney Inlet, one in Dawley Passage). Thus the eventual maximum would be 46 farms.

Many people in the region are worried about the impact of fish farming on wild fish stocks and natural habitats. However, studies so far suggest that there is little cause for concern[21]. Native diseases of farmed fish are already present in the wild; and great care is taken to prevent the introduction of exotic diseases. Use of antibiotics on fish farms is unlikely to affect wild fish or to result in drug resistance being passed from fish to humans.

In general, fish farms do not have a significant impact on dissolved oxygen levels. Fish farm effluent has very local effects. It attracts rock fish and other wild fish, and increases local plankton growth but not to harmful levels. It also reduces the diversity of bottom-dwelling organisms immediately below the fish farm, and waste can build up directly beneath marginally sited farms.

Farmed fish would have a genetic impact on wild populations, only if large numbers of farmed fish repeatedly escaped, survived, and bred with depleted stocks of wild fish. Nevertheless, concerns remain. To provide long term insurance— while still allowing development of aquaculture—we should consider two options. One option is to freeze the number of farms at the current level, and conduct a full assessment of their environmental and socioeconomic impact. The other option is to allow expansion up to a maximum of 46 farms (or some other maximum), while ensuring that:

- Current guidelines on the dispersal of fish farms are maintained. However, there should be some flexibility to allow for the distribution of sites to be reorganized to optimize growing conditions and minimize environmental impacts.
- Fish farms are excluded from sensitive, unique or highly diverse water bodies.
- Fish farms are excluded from at least one of every major water body type.
- Visual impact is minimized by requiring that buildings blend with the background.

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21. Fisheries & Aquaculture study: 79-81.

Action 3.6 Carefully control the introduction of non-native species.

Fish farmers are increasingly raising Atlantic salmon because it is more productive and fetches a better price than Pacific salmon. This could be good or bad for local salmon stocks. If the main danger from fish farming is the impact of escapes on the genetic integrity of local salmon, then Atlantic salmon are probably a good thing. This is because they are less likely to interbreed with local salmon than are farmed salmon of the same species.

If the main danger is of escapees establishing themselves and outcompeting local stocks, then Atlantic salmon may be a bad thing. This possibility is dismissed by aquaculture experts, who contend that the native fish would out-compete the Atlantics. However, throughout the world the impact of introduced species— particularly fish species—has been consistently underestimated. Native salmon stocks are clearly in trouble and their capacity to keep foreigners in their place may be weak. Also the possibility of Atlantic salmon hybridizing with native salmon, while remote, cannot be ruled out altogether. Introductions of non-native species should follow international guidelines as set out in *A Wildlife Policy for Canada*:

> "Introductions of species from outside Canada, as well as from one jurisdiction to another within Canada, should be controlled. Introduction of a non-indigenous or genetically-engineered species should be considered only if:
>
> "No indigenous species is suitable for the purpose of the introduction.
>
> "Clear and well defined benefits to human or natural communities are foreseen.
>
> "No known adverse environmental impact is foreseen and some means of controlling the introduced population exists (such as predators, or climate).
>
> "No non-indigenous or genetically-engineered species should be introduced into a natural ecosystem. No non-indigenous species should be introduced into a modified ecosystem unless:
>
> "There are exceptional reasons for doing so.
>
> "The operation has been comprehensively assessed and carefully planned in advance.
>
> "Provision is made for monitoring any effects.
>
> "Non-indigenous species may be introduced into cultivated and built ecosystems, provided an assessment is made of the potential impacts on nearby modified and natural ecosystems and there is an effective plan to minimize negative impacts."

The introduction of any more Atlantic salmon should be reconsidered in light of these guidelines.

Shellfish culture

Shellfish aquaculture is less developed, producing 67 tonnes of oysters in 1989. At present 13 oyster tenures are operating, raising Japanese (Pacific) oysters mostly by suspended

culture. The largest number of farms is in Lemmens Inlet. Two farms raise scallops. An additional 26 sites have been identified as potentially suitable for oyster culture, provided there is no conflict with other uses of the areas concerned[22]. A number of these sites may prove to be unsuitable.

For meat production, using suspended culture, sites should be as close to the open ocean as possible. There, growth potential and product quality are better, and the growing season is longer. For cocktail half-shell production, sites should be where fouling is reasonably low and growth and quality high. These exist but are hard to find. A local oyster farmer has developed a stacking tray system that can be used at 1.5-10 metre depths with only a few small net floats as buoys. This could reduce competition with other uses[23].

Action 3.7 Ensure high water quality for shellfish culture.

High water quality is critical for shellfish culture. Existing oyster farms must be protected from activities that may lower water quality, such as recreational and fishing boat anchorages, human settlements, fish farms, and logging. Any additional sites must be chosen with care, to avoid unacceptable competition with these activities. To prevent pollution, recreational and fishing boats should not be allowed to anchor closer than 125 metres from a shellfish farm.

Seafood processing

Action 3.8 Develop a plan to expand local seafood processing.

There is scope for expanding local processing in Ahousat, Tofino, and Ucluelet, which will benefit development both of aquaculture and of the wild fisheries. However, the potential is limited by the poor state of many of the stocks and by the tendency to concentrate processing in the cities.

One school of thought is that the salmon market is glutted. Another is that a joint marketing campaign by salmon fishers and salmon farmers would increase Canada's share of the market. As much as possible of local farmed and wild production should be processed locally in Ahousat, Tofino or Ucluelet.

One constraint on the expansion of local processing is the lack of housing. Together, Tofino and Ucluelet could increase the local housing supply without imposing an excessive strain on either community.

Another constraint is the trend toward processing in metropolitan centres such as Vancouver. This could be countered by allocating farm and fishing licences preferentially to producers who will supply local processors. We should explore the potential and implications of this.

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22. Fisheries & Aquaculture study: 74-76.
23. Jim Martin, Ucluelet, submission.

9. TOURISM

Clayoquot Sound is a unique tourism resource, due to its unusual combination—unmatched by any other coastal area in North America—of natural beauty, wildness, and accessibility.

Together, Clayoquot Sound, Barkley Sound and the rest of Alberni-Clayoquot form a natural tourism region with a promising future if planned and marketed as a unit. Consequently this chapter, while focussing on Clayoquot Sound, will also cover other parts of the Regional District where appropriate. Actions proposed in this chapter refer to Clayoquot Sound unless specified otherwise.

Estimating the value of tourism in Clayoquot Sound and the Regional District is difficult because of the lack of reliable data (see Appendix 7 for a discussion of the various estimates available). Nevertheless, it is clear that tourism is the second largest resource-based industry in Alberni-Clayoquot, after timber production. And, for residents of Clayoquot Sound, it is one of the two top resource-based industries, the other being seafood production.

Community Tourism Action Plans (CTAPs) have been completed for Tofino, Ucluelet, and Port Alberni. The Vancouver Island/Coast Tourism Task Force has made many general recommendations to improve the industry[1]. The tourism interest group will review these documents and consider their recommendations for this Strategy. A combined CTAP for the region has been proposed. The Ministry of Tourism will be asked to ensure that this is done in collaboration with the Steering Committee.

Goal

The goal of this part of the Clayoquot Sound Sustainable Development Strategy is to develop sustainable tourism. Tourism will be sustainable when it:

Provides reliable and rewarding employment for people in the industry.

Has secure access to the resources it needs.

Is within the ecological carrying capacity of its resources.

Is within the social carrying capacity of communities visited by tourists.

Maintains air quality, the health of the atmosphere, water quality, the variety and integrity of ecosystems, or the diversity of species.

Coexists equitably with other resource industries.

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1. Vancouver Island/Coast Tourism Task Force 1991.

Action 4.1 Determine the nature and value of tourism in Alberni-Clayoquot.

Existing information on the nature and value of tourism—both in the Regional District and in Clayoquot Sound—is controversial and quite inadequate for development planning, investment, marketing, or protection of resources.

A visitor survey should be done to provide an accurate assessment of:

How many tourists visit Alberni-Clayoquot.

Where they come from.

Where they stay (Alberni Valley, Bamfield, Ucluelet area, Tofino/Clayoquot Sound).

How long they stay in each place.

How much they spend in each place.

Their activities (what they see and do) and the locations they visit.

Their impressions of what they see and do.

What other things they would like to see or do.

Other questions can be considered, depending on the cost.

The survey should start as soon as possible. It should cover at least from March through September, and ideally a full year.

Action 4.2 Assess the carrying capacity of all tourism resources and ensure that tourism activities do not exceed this capacity.

Some campsites in the area are at the limits of their carrying capacity. Long Beach is heavily used. More remote beaches are being fouled by inconsiderate tourists. Hot Springs is crowded in the summer. Erosion and damage to vegetation are signs of pressure on the Meares Island trail, and additional areas for viewing big trees need to be developed.

There is concern about the effect of sport fishing, particularly on chinook salmon. The contributions of local and other stocks to local sport fishing need to be determined (see Action 3.1 of Chapter 8 on Fisheries and Aquaculture).

Whale watching may cause stress to whales in the summer, when there are a lot of tour operators and few whales. The effects of visitor pressure on other animals (such as sealions and seabirds) also need to be considered. The impact of whale watching is being investigated by a research team from the University of Victoria.

The impact of boat traffic needs to be assessed and monitored. Increased boating already may have contributed to disturbance of brant geese. Further increases may harm wildlife populations or come into conflict with commercial fishing and aquaculture.

Actions 4.4, 4.5, 4.6, and 4.7 propose ways of helping tourism stay within carrying capacity by developing a wider range of attractions.

Action 4.3 Assess the social carrying capacity of communities visited by tourists and ensure that tourism does not exceed this capacity.

This is partly a matter of making sure that tourism does not exceed the tolerance of most residents for the inconveniences caused by large numbers of visitors. The community values survey of Tofino shows that many people are annoyed by crowding and congestion by tourists in summer[2]. Some people would like certain places to be protected from tourists.

Theoretically, one way of reducing congestion would be to make sure that visitation does not increase in the high season—for example, by not expanding accommodation—while increasing visitation in the low season, by effective marketing efforts. But this is easier said than done.

Social carrying capacity is also a matter of ensuring that the tourism industry coexists equitably with other resource industries: for example, a fair share of fish stocks between sport fishing and other users (commercial fishing; aboriginal food fishing). To help in this, compatibilities between tourism and other industries should be identified and promoted as part of this Strategy.

Action 4.4 Reduce the focus on whales outside the migration season.

Too much emphasis is placed on whales in both Tofino and Ucluelet. This is fine during the whale migration. But the number of whales that stay in Clayoquot Sound during the summer months is too small to sustain a significant volume of whale watchers without the risk of harassing the whales. The catch is that if people expect whales and don't see them or don't see much of them for long, they will be disappointed. There is a great diversity of wildlife to enjoy and there is also the old-growth forest itself, which seems to be a neglected tourism asset. The forest, the diversity of the coast, and the diversity of wildlife should be the main attractions. Concentration on big animals to the relative neglect of small animals and plant life is a common mistake made throughout the world.

Community values surveys show overwhelming support for regulation of whale watching[3]. Even if current research shows that harassment is not a problem, regulation will

2. Summary of community values surveys.
3. Summary of community values surveys.

prevent a problem from developing. A set of guidelines on good whale-watching practices already exists. They should be reviewed; and ways should be found of making sure that all operators abide by them.

Action 4.5 Develop interpretation facilities and improve guide services to enhance appreciation of coastal ecosystems, forest ecosystems, and sustainable uses of renewable resources.

These are necessary to establish a broader range of attractions. Appreciation of the plants and animals of coastal and forest ecosystems needs to go beyond whales, giant trees and other biggies. For example, other attractions could include bird watching, and experiencing the diversity of marine and forest habitats. In addition, if sustainable living is to be meaningful the gap should be closed between nature tourism and industrial tourism. Examples of sustainable fisheries, aquaculture, and timber production, or of genuine efforts to achieve sustainability, provide valuable tourism opportunities.

This would not necessarily involve setting up new information centres. Rather it calls for providing more informative leaflets, booklets, videos, and similar ways of educating tourists. Also, the possibility should be explored of providing training courses for local guides at the Port Alberni campus of North Island College.

Action 4.6 Adopt a sustainable tourism development plan for old-growth forests.

This should include forests in the Ucluelet area as well as within Clayoquot Sound, so that all old-growth forests that are available and suitable for tourism share the load. Some of the areas should be easy to use and be equipped for relatively large numbers of visitors. This means boardwalks. Others will be for hardy hikers and should be limited to small numbers of visitors.

He-Tin-Kis Park in Ucluelet and the Rain Forest Trail in Pacific Rim National Park Reserve are examples of high quality boardwalk experiences. The He-Tin-Kis-Park boardwalk should be given more publicity. The short circle trail on Meares Island should be made into a boardwalk to prevent further damage.

The remaining trails on Meares Island should be dedicated to low level use. They will probably need to be supplemented by other trails. Existing trails include one across Vargas, one up the Bedwell, and the Hot Springs to Hesquiat trail. All trails should be monitored for visitor impact.

Action 4.7 Adopt a sustainable tourism development plan for cultural heritage.

Cultural heritage is a valuable tourism resource but it is also one of the most sensitive. Physical sites can easily be damaged, and some may be looted or vandalized. Living culture can be turned into a museum piece or a degrading spectacle.

However, there are several themes that could be developed to enhance appreciation of past and present Native ways of life and of the shared history and culture since Europeans and Asians arrived on the west coast. Some of this is already done at the Wickaninnish Centre, but additional attractions could be developed on-site. Two possibilities are:

> Natives and old-growth forest. Natural forest is often thought of as uninfluenced by people. But the Nuu-chah-nulth and their ancestors have been living with and affecting rain forest for thousands of years. This theme can be explored by showing groves of culturally modified trees and displays and demonstrations of traditional uses of cedar.
>
> History of resource use. From traditional plant gathering, fishing, and whaling, through the early days of trading, logging and fish canning, to the present day. Native communities should have control over tourism development of their cultural heritage sites.

Concerning archeological sites, the Vancouver Island/Coast Tourism Task Force[4] recommends that:

> The development of any archeological site should involve the cooperation of the relevant community and the Archaeology Branch of the Ministry of Tourism and Culture. The guidelines of the Archeology Branch should be strictly followed.
>
> The decision to publicize the location of an archeology site, or make it accessible to the public, should be based on a review of the sensitivity of the site and the degree to which access can be monitored.
>
> If very sensitive sites are of potentially significant interest to visitors, consideration should be given to providing a replica of, or interpretive information about, the resource away from the actual site.
> The public should be informed by guides or clear signs of the need to be sensitive to the site.
>
> A "Watchman Program", similar to that used by the Haida in the Queen Charlotte Islands, could be considered. However, this is expensive.
> Determine what is needed to protect each archeological site, and provide the necessary protection.

Because of the difficulties and cost of protecting archeological and other cultural heritage sites, only a limited number should be developed for tourism.

A tourism development plan for cultural heritage should identify the most suitable cultural heritage sites. It should also explore the potential for developing historic sites such

4. Vancouver Island/Coast Tourism Task Force 1991.

as Cannery Bay, and heritage trails such as Willowbrae Trail. An inventory of historic buildings is needed as well.

Action 4.8 Protect the resource base of tourism.

Tourism products—the activities and experiences that tourists travel to enjoy—depend on the availability of tourism resources. These vary with the product. Urban tourism requires shops, arts and crafts, heritage buildings, museums and galleries, theatres, and so on. Industrial tourism requires well interpreted access to mining, timber production, fishing, aquaculture, and other economic sectors.

Tourism in Clayoquot Sound and Barkley Sound is predominantly nature tourism in the broadest sense. The tourism products are a wide range of outdoor activities and experiences that are not usually available to people back home in their urban and suburban/rural environments. They include: beachcombing, boating, camping, canoeing, enjoyment of old-growth forests, fishing, forestry interpretation, hunting, mountain biking, Native heritage appreciation, photography, picnicking, sailing, scuba diving, sea kayaking, walking, wilderness hiking, wildlife viewing (whales, birds, basking sharks, salmon), and windsurfing.

These activities fall into four main groups, depending on where they take place and how the places are reached:

> Marine tourism. There are two kinds of marine tourism: sport fishing; and coastal enjoyment (power cruising, sail cruising, wildlife viewing, scuba diving, sea kayaking). These take place throughout the coastal and marine parts of Clayoquot Sound.
>
> Land tourism. There are also two kinds of land tourism in Clayoquot Sound. Road-accessed land tourism includes many activities taking place in and around the Esowista Peninsula, Tofino, Long Beach, and Kennedy River and Lake. Boat-accessed land tourism consists of hiking, canoeing, and wildlife viewing along the coast of Flores Island and Hesquiat Peninsula, on Meares and Vargas Islands, and along some of the lakes and streams on the mainland (Bedwell, Megin, Pretty Girl Lake, etc.).

In terms of current economic value and volume of participants, the four groups probably rank as follows:

1. Road-accessed land tourism.
2. Sport fishing.
3. Coastal enjoyment.
4. Boat-accessed land tourism.

This is a guess. It can be confirmed only by a proper survey (see Action 4.1).

The last two groups (coastal enjoyment and boat-accessed iand tourism) include activities

that the tourism industry would classify as "adventure travel": kayaking, canoeing, camping, hiking, and wildlife viewing, in relatively remote places and in ways that may be physically demanding.

A subset of the last three groups—that is, some sport fishers and many but not all boaters, kayakers, canoers, hikers, and wildlife viewers—want a genuine wilderness experience. By definition, this is low volume tourism: the wilderness experience is lost if there are too many people in the same place at once.

The resources required for *all* four groups are at the very least attractive scenery and an abundance and diversity of wild animals and plants. Many of the activities depend on wild, natural locations and views; all are enhanced by them.

Visitors to the Long Beach Unit of Pacific Rim National Park cite scenery, suitable weather conditions, information on arrival at the park, and untouched natural environment as the main criteria for making their trip a success. Visitors to the Broken Group Islands—who are likely to be more representative of "adventure travellers" than visitors to Long Beach—cite natural features, adventure, and getting away as the main motives for visiting the area[5].

Sport fishers want plenty of big fish in a scenic coastal setting. For some the fish are more important than the setting. For others the setting is more important than the fish. Other marine tourists (power cruisers, sail cruisers, wildlife viewers, scuba divers, kayakers) want a scenic coastal setting and opportunities to see a variety of wildlife.

According to a 1989 survey, marine tourism operators in BC regard commercial fishing, the state of fish stocks, pollution, logging, and government resource management practices as the most serious resource problems[6]. Similarly, the Vancouver Island/Coast Tourism Task Force states that ongoing growth of the marine tourism industry depends on the maintenance of scenic, pristine coastal views. Visible forestry activity may discourage some recreational boaters[7].

Beauty is in the mind of the beholder. Some people have to be educated to like old-growth forests ("why are there so many dead trees?"). Many people—probably most people who come to Clayoquot Sound for the scenery—do not like large recent clearcuts. At the same time, most people probably do not require that all the scenery be natural as defined in this document (in other words, wilderness). A combination of natural and modified landscapes would be fine, provided the modifications are not ugly and that exceptionally beautiful areas are left natural.

Key areas for tourism proposed to be kept in a basically natural state have been identified

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5. Canadian Parks Service, Western Region, Socio-Economic Services. 1991.
6. ARA Consulting Group 1991.
7. Vancouver Island/Coast Tourism Task Force 1991.

by Tofino's Chamber of Commerce. In addition, the resource base includes areas for industrial tourism—visits to logging sites, fish processing plants, fish farms, and so on. All areas will be confirmed by the Steering Committee through discussions with the interest group and the public.

Action 4.9 Spread the benefits of tourism throughout Alberni-Clayoquot, and carefully control tourism development in Clayoquot Sound.

People in Alberni Valley and the Ucluelet area were asked whether tourism should be a bigger part of the local economy. Clear majorities in both communities agree that it should, although the proportions in each place differ: 71% in Alberni (with 9% disagreeing); 50% in Ucluelet (with 19% disagreeing).

Tofino was not asked this question. Instead, residents were asked to indicate how much they wanted various types of tourism development:

	Do not want	Want
Bike paths	4%	88%
Tourism that promotes environmental awareness	7%	81%
Tourism developments by local residents rather than outsiders	6%	76%
Small tourism developments rather than large	5%	73%
Hiking trails	11%	71%
More cultural activities	12%	71%
Regulated bed and breakfast operations	16%	68%
More emphasis on tourist wilderness experiences	19%	60%
Education programs/events for tourists	18%	58%
Shuttle bus for tourists	25%	58%
Taxation of tourists for municipal costs	31%	49%
More general sightseeing tours of the area	26%	48%
New marina	44%	33%
More restaurants	38%	32%
More hotels/motels	5%	28%
Concession stands on beaches	76%	13%
More sport fishing charters	67%	12%
More pubs	74%	11%
More whale watching tours	75%	8%
Trophy hunting as a tourist activity	91%	5%

There is a clear desire for more small-scale, locally initiated tourism development, that does not harm the environment, and increases environmental awareness. Fewer people want than do not want major infrastructural development such as restaurants, hotels, and a marina. There is substantial opposition to activities that have an impact on animal populations, such as more sport fishing, more whale watching, and trophy hunting. A significant number of people in Tofino complain of too many tourists, particularly in summer[8]. There is a strong demand that tourism development in Clayoquot Sound be carefully controlled.

Economic benefits from tourism in Clayoquot Sound could be increased. One or more additional destination resorts would provide the biggest economic benefit. The most promising small-scale products may be boating (including kayaking), coastal hiking and "ocean to alpine" hiking, using Meares, Flores, Hesquiat Peninsula, and the Megin, Sydney, and Bedwell or Moyeha drainages. Ways of capturing more economic benefit from these products need to be explored. To develop them, accommodation could be built in these areas over the next 10 years and included in packages with operators in Tofino and Ucluelet.

Some people (maybe many) regard the prospect of Clayoquot Sound dotted with resorts as quite unappealing[9]. But since Tofino and Ucluelet are usually fully booked in July and August, the only ways of providing for growth are to promote more tourism in the other months and to expand accommodation. Probably the best course is to centre most of the accommodation expansion in Tofino and Ucluelet, with very careful and limited development elsewhere in Clayoquot Sound.

Action 4.10 Develop and promote a regional marketing strategy on the theme of sustainable living.

Alberni-Clayoquot is a natural tourism unit, consisting of two major drainage basins (Clayoquot Sound and Barkley Sound) reached by most visitors only via Port Alberni. It has a great diversity of attractions. Therefore, it is well suited to a regional marketing strategy. The region is the first in BC to have attempted a sustainable development strategy. Assuming the strategy is successful and a commitment to sustainability is made by all resource users, sustainability could provide a unique marketing focus.

A physical focus could be provided by developing a Sustainable Living Show. This would be a permanent centre, in or near Port Alberni. It would be designed for two functions. First, to be an attraction in its own right, with entertaining exhibits and displays explaining the idea of sustainability, the ecosystems and communities of the region, sustainable uses of natural resources, manufacture of products from sustainably-produced resources, recycling.

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8. Summary of community values surveys.
9. Jim Eviasuk, Ucluelet, submission.

Second, it would be a directory of demonstrations of sustainable living throughout the region: from parks and wildlife viewing to industry tours. People would go to the Sustainable Living Show to have fun and be educated and to find out where to go in the region to see in real life whatever interests them.

This would help to spread the benefits of tourism throughout the region. It could help to relieve pressure on sensitive areas and encourage visitors to more robust sites. And it could extend the tourism season by promoting a wider range of attractions.

10. MINING

Although no metal mines are currently operating in Clayoquot Sound, they have in the past, and there is strong potential for the discovery of economically mineable ore deposits in the future. Industrial materials, such as sand and gravel, are being mined and used locally at present. The area has a long history of mineral exploration and this continues today. However, difficulties of access and the thick forest cover hiding bedrock geology have hindered detailed exploration of much of the area.

As of February 1991, about 400 mineral claims covered 25% of the land area of Clayoquot Sound. But these figures will change with time. There are more than 150 known mineral occurrences, and much of the area has favourable to highly favourable mineral potential. Only the coastal plain (Hesquiat Peninsula, Vargas Island, and Esowista Peninsula) has little or no mineral potential. Because subsurface resources are hidden, it is impossible to predict when exploration will lead to the development of a new mine[1].

The difficulties in preparing an inventory of these resources are as great as trying to establish a comprehensive inventory of flora and fauna. Chapter 5, Goal 3, sets out criteria by which mining would be compatible with the principles of sustainable development. Accordingly, mining should be excluded only from protected areas. As far as possible, a detailed inventory of the subsurface resources of a proposed protected area should be made as part of a full assessment of the area's values.

Exploration and mining activities are fully regulated by the government and complete reclamation of any surface disturbance is required. Security bonds are held to ensure reclamation work is completed. Consequently, exploration and mining activities can be modified to meet requirements to conserve water quality, soil quality, the variety and integrity of ecosystems, the diversity of species and genetic stocks, and the resource base of other industries. The existing Mine Development Assessment Process and the referral process for exploration proposals—both of which include public participation—are designed to ensure this is done.

Future mines would most likely be developed as small underground operations that would have limited impact on other resource values or industries. As a result, these mines could be made compatible with the goals and targets of the sustainable development strategy relatively easily.

There is also potential for large openpit mines, such as on the known Catface copper deposit. An acceptable mine development proposal at this site would be much more difficult to achieve. Of particular concern are the potential negative effects on the important spawning habitat for herring along all three shores of Catface, as well as on spawning habitat for coho and chum salmon in Whitepine Cove Creek and Little Whitepine Cove Creeks. Cypre River, an important salmon stream, could also be affected.

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1. Mining study.

In addition, the views from Tofino, Ahousat and offshore would be changed considerably, which would have an impact on tourism and the local quality of life. If copper prices go up enough, or further exploration reveals richer deposits, Catface could become economic to mine. If so, all these and other concerns must be addressed publicly through the Mine Development Assessment Process before approval for any development could be given.

Goal

The goal of this part of the Clayoquot Sound Sustainable Development Strategy is to develop sustainable mining. Mining will be sustainable when it:

> Maintains air quality, the health of the atmosphere, water quality, the variety and integrity of ecosystems, and the diversity of species and genetic stocks.
>
> Has assured access to a sufficient land base for it to be economically viable and provide a secure supply of mineral resources.
>
> Provides reliable and rewarding employment for people in the industry.
> Coexists equitably with other resource industries.

Action 5.1 Develop a plan to maintain a sustainable mining and exploration industry in Clayoquot Sound.

Given the considerable mineral potential of Clayoquot Sound and the limited detailed exploration to date, the opportunities for continued responsible mineral exploration are great. The potential economic benefits to local communities, to the Alberni-Clayoquot Region, and to the province cannot be overlooked. What is required is a strategy that will provide confidence:

- To the mining industry, that responsible exploration and fully reviewed development within a framework of sustainable development.
- To representatives of other resource values and to local residents, that their interests will be fully accounted for in the review of proposals for exploration activities and mine developments.

A strategy should be formulated to ensure all other resource values and sectoral concerns in Clayoquot Sound are addressed in the review and approval of proposals for exploration and mining developments. Since the review and approval processes already exist, the strategy should focus on ensuring that all proposals are properly communicated to all interested parties so that their interests can be identified and addressed. This strategy should be a component of the Clayoquot Sound Sustainable Development Strategy.

Areas where special resource development guidelines are to be applies or areas proposed for protection from resource development should be identified. In sensitive areas, management guidelines should be recommended to protect and sustain the various resources and values of Clayoquot Sound. A full evaluation of all resource values, specifically including assessment of subsurface resources, should be undertaken prior to any final decisions on new protected areas.

11. IMPLEMENTATION

The chapters on natural diversity, forests and timber production, fisheries and aquaculture, tourism, and mining recommend actions to achieve the goals and targets set out in Chapter 5. Most of the actions require further development. They are not well defined at this stage. The Steering Committee will work on this during the next months.

We will aim to produce an implementation plan that will spell out the actions that the Steering Committee agrees to take as a body and the actions that each of the represented parties agree to take. We will estimate the costs of each action (where relevant) and propose a timetable.

We aim to agree on three kinds of action:

- Designations of parts of Clayoquot Sound for particular purposes.
- Guidelines and a system for managing resource uses in Clayoquot Sound that will maintaining heritage values, natural diversity, and environmental quality.
- Actions to improve the economy in ways that are sustainable..

Only an outline of what the implementation plan might look like is given here.

Designations

An inventory of the resources and values of Clayoquot Sound is being assembled and will be mapped.

Protected areas (areas to be given formal protection as ecological reserves, provincial parks, or similar)

1. Adopt criteria (Steering Committee).
2. Make initial selection on the basis of the criteria (Steering Committee).
3. Review for conflicts with other goals/targets/interests (Steering Committee).
4. Decide: (a) Accept (with or without modifications); (b) Study (study areas are deferred from mining activity or timber production until a decision is made); (c) Reject (Steering Committee).
5. Designate accepted areas (Provincial Government).
6. Initiate studies of Study areas (Steering Committee & Provincial Government).
7. Prepare management plans for designated areas (Provincial Government).

Working forest (areas with priority to fibre production)

1. Adopt criteria (Steering Committee).
2. Make initial selection on the basis of the criteria (Steering Committee).
3. Review for conflicts with other goals/targets/interests (Steering Committee).

4. Decide: (a) Accept (with or without modifications); (b) Study (study areas are deferred from mining activity or timber production until a decision is made); (c) Reject (Steering Committee).
5. Designate accepted areas (Provincial Government).
6. Initiate studies of Study areas (Steering Committee, Provincial Government & TFL holders).
7. Prepare management plans for designated areas (Provincial Government & TFL holders).
8. Calculate LRSY of designated areas (Provincial Government & TFL holders).

Areas to be kept natural but without formal protection

These are areas needed for tourism, conservation of habitat for fisheries, or conservation of natural diversity, but not requiring protection in a park or reserve.

1. Adopt criteria (Steering Committee).
2. Make initial selection on the basis of the criteria (Steering Committee).
3. Review for conflicts with other goals/targets/interests (Steering Committee).
4. Decide: (a) Accept (with or without modifications); (b) Study (study areas are deferred from timber production until a decision is made); (c) Reject (Steering Committee).
5. Designate accepted areas (Provincial Government).
6. Initiate studies of Study areas (Steering Committee & Provincial Government).
7. Prepare management plans for designated areas (Provincial Government). Alternatively, management can be covered by more general management guidelines (Steering Committee).

The issue of formal designation of these areas needs to be discussed. Some areas may be part of the working forest, in which case only step one (adopt criteria) may be taken, as part of the development of management guidelines (see Action 1.2 below).

Designations for fisheries and aquaculture, tourism, and mining are covered by the actions below.

1. Maintaining natural diversity

The only workable strategy to achieve Goal 2 is a combination of protected areas (parks and reserves) and management for diversity throughout the rest of the landscape.

Therefore three actions are proposed:

Action 1.1 Adopt a protected areas plan for Clayoquot Sound.

Parks and reserves are needed in Clayoquot Sound to protect:
- At least 10% of each major ecosystem, ensuring that this includes a viable example of every vegetation type or plant/animal community.
- Core areas for wild species, particularly species that are sensitive to human disturbance.

- Important heritage sites.
- A baseline monitoring area.
- Priority areas for wilderness recreation and tourism.

Criteria will be adopted (some are proposed). An initial selection should be made on the basis of the criteria, after a review of the extent to which the criteria are already covered by the seven existing protected areas in Clayoquot Sound. The review should build on assessments in progress for provincial parks and ecological reserves.

Action 1.2 Adopt management guidelines to conserve the natural diversity of forests.

The following guidelines are proposed:

- Maintain the full range of age-stages of the forest, particularly the two youngest (grass-forb and shrub-seedling) and two oldest stages (mature and old-growth).
- Maintain areas of mature or old-growth forest connected by corridors of forest interior habitat. It is probably desirable that harvest units are in a mixture of sizes, rather than all large or all small.
- Protect riparian areas and upland deciduous (broadleaved) stands.
- Retain old-growth characteristics important for wildlife: large live trees; snags; coarse woody debris; structural variety; age; microclimate.
- Leave patches of live trees and snags within the cutblock.
- Maintain coarse woody debris (both solid logs and decaying material) wherever it does not interfere with planting.
- Create structural variety by thinning some areas and leaving others, and by thinning to a mixture of densities; by promoting a mix of tree species, including hardwoods; by retaining patches of brush along streams, on low-productivity microsites, and on the retained patches of live trees and snags.
- Adopt long rotations for some stands to allow large old trees to develop.

Action 1.3 Adopt management guidelines to conserve the natural diversity of coastal ecosystems.

Similar guidelines need to be developed for Clayoquot Sound's coastal habitats and the species that rely on them. The guidelines should include measures to help restore waterfowl numbers, if practicable.

2. Forests and timber production

Actions 2.1 and 2.2 cover Goals 1 through 3 as they apply to forests and timber production.

Action 2.3 covers Goals 4 and 5.

Action 2.1. Ensure that all timber harvesting is sustainable.

This is a matter of designing timber harvest levels and practices to achieve several different objectives:

- Production of a sustainable supply of timber.
- Maintenance of water quality and normal rates of flow.
- Protection of fish and wildlife habitat.
- Maintenance of scenic values for residents and the tourism industry.
- Conservation of the variety and integrity of ecosystems and the diversity of species and genetic stocks.

There are two kinds of system of harvesting and regenerating the forest: even-aged (clearcutting) and uneven-aged (selection cutting). No one system can achieve all of these objectives. We assume that several systems will be used in an area the size of Clayoquot Sound.

Practical management units should be adopted, probably based on watersheds or groups of watersheds. We then have two options: to try and achieve all the objectives in every watershed; or to allocate watersheds to different objectives. The latter is probably more practical. If it is followed, the Strategy could include a zoning system, designed to meet all forest objectives in Clayoquot Sound as a whole but not necessarily in every watershed.

Timber inventories for Clayoquot Sound should be recalculated, using major watersheds or equivalent areas as the basic inventory unit, and taking account of any other resources and values in accordance with criteria to be agreed.

Action 2.2 Establish a baseline monitoring area and an experimental forest in Clayoquot Sound.

These are needed to develop a stronger base of knowledge for sustainable forest management.

An experimental forest should meet these criteria:

- Be typical of a widespread forest and watershed type (in terms of forest cover types, site quality classes, form of the watershed).
- Be representative of a forest or watershed type not already covered by an existing experiment. For example, it should be a different watershed type than Carnation Creek. Most Clayoquot Sound watersheds qualify.
- Not include any unique or rare habitats or depleted populations that might be destroyed, seriously degraded or threatened by an experiment.

A baseline monitoring area should meet these criteria:

- Be a natural (unmodified, undisturbed) ecosystem.
- Be as protected as possible from outside influences. This means that it should be large and consist of one or more intact watersheds.
- Represent as many biogeoclimatic units as possible. This can be achieved by covering a gradient of elevations.
- In at least one site, be a primary watershed to capture the marine/freshwater interface.

Action 2.3 Develop a plan to improve the competitiveness of the timber industry and ensure a smooth transition to sustainability.

This action requires development along the following lines:

- Secure the land base. Taking account of the need to maintain environmental quality and protect other forest values, the industry needs large areas of economically accessible and operable forest land to be secured as working forest.
- Improve the competitiveness of the timber industry.
- Try to increase the number of jobs per unit of wood harvested. Efforts to improve economic efficiency are having the opposite effect.
- Retain in the region as much as possible of the value of the wood harvested in the region.
- Examine the potential for increasing the number of jobs in improved silviculture. This would require expanding the area of cultivated forest.
- Review Ministry of Forests policies that reduce the economic efficiency of the industry. Change those that are not necessary for sustainability or the protection of other forest values.
- Determine sustainable harvest levels and, taking advantage of the above measures, ensure a smooth transition to those levels.

3. Fisheries and aquaculture

Actions 3.1 through 3.7 contribute to Goals 1 through 4, and indirectly to Goal 5, as they apply to fisheries and aquaculture. Action 3.8 contributes to Goals 4 and 5.

Action 3.1 Restore and maintain salmon and trout stocks.

Three measures are needed:

Enhancement
One option is to help wild stocks reach the maximum natural production capacity of their native streams. Another is to produce as many fish as possible by concentrating on a few major facilities such as the Robertson Creek hatchery.

Since so much effort has been put into large projects, a case can be made for concentrating on the first option. Local wild populations are likely to be genetically adapted to local conditions, which could be important for the long term future of salmon in the region. Efforts to rebuild wild stocks should not try to enhance them beyond the natural production capacity of their native stream. Therefore, they should begin with proper assessments of the stream's production capacity and current smolt production. If production is close to capacity, then the stock does not need to be enhanced.

It is recommended that the Tofino Salmon Enhancement Society, Thornton Creek Enhancement Society, and Nuu-chah-nulth bands in Clayoquot Sound, in cooperation with DFO, prepare an enhancement plan and budget, based on such an assessment. This should concentrate initially on the most productive streams.

DFO is assessing chum stocks in the area and will reevaluate the escapement target. The reasons why sockeye recovery has been so poor in the Kennedy system needs further investigation. The Canadian and US Governments are evaluating more effective approaches to rebuilding coho stocks.

Except for the Kennedy River, Tranquil Creek and Cypre River stocks which are semiwild, Clayoquot Sound chinook are truly wild (their numbers have not been supplemented by hatchery bred fish). They may also represent a unique gene pool. This needs to be determined. A recovery program should be undertaken urgently throughout the Sound, focussing initially on those streams where they are most abundant.

Control of fisheries

Control of salmon fisheries will depend in part on getting more accurate information on local and distant harvests of Clayoquot Sound salmon stocks, especially sockeye, coho and chinook. A survey is needed of the local commercial, sports and aboriginal fisheries. A tagging or similar program is needed to obtain better data on the harvest of local salmon in distant waters.

Escapement and exploitation rate studies are needed on steelhead, cutthroat, rainbow, and Dolly Varden. The fisheries should be developed conservatively.

Restoring and protecting spawning habitat

Targets for habitat protection or restoration (as applicable) should be defined for each watershed in Clayoquot Sound. All forest users will be responsible for complying with the targets. This will include scrupulous application of the Coastal Fish Forestry Guidelines, currently being revised. Additional site specific actions may also be required. Better monitoring of compliance is needed.

Action 3.2 Protect herring spawning habitat, and assess the impact of herring harvesting on the food chain.

The priority needs are to protect herring spawning habitat; and to get a better understanding of the ecological importance of herring and the impact of harvesting on the rest of the food chain. A cooperative research project has begun with the Hesquiaht Band under DFO's Tribal Cooperative Research Program. A lower priority is to investigate more sustainable ways of harvesting herring.

Action 3.3 Ensure the sustainability of fisheries for shellfish.

Geoducks. Obtain reliable information on the size and rate of recruitment of the commercially accessible stock; and the impact of harvesting on the benthic (sea floor) ecosystem.

Clams. Undertake a comprehensive review to determine the status of the stocks. Obtain better information on population sizes and densities; recruitment rates in relation to year

class abundance and biophysical conditions; and competition among species. Test alternative management strategies.

Sea urchins, sea cucumbers and **gooseneck barnacles.** Undertake an assessment of the fisheries to find out the size and condition of accessible stocks and the size of the harvests. Longer term studies on recruitment and growth rates of these species are also needed.

Crabs. Consider increasing the size limit from 6.5 inches to 7 inches.

Action 3.4 Review the sustainability of other fisheries.

Review the sustainability of fisheries for lingcod and rockfishes.

Action 3.5 Place a ceiling on the expansion of fish farming.

We should consider two options to provide long term insurance against undesirable impacts of fish farms, while still allowing development of aquaculture. One option is to freeze the number of farms at the current level, and conduct a full assessment of their environmental, social and economic impacts. The other option is to allow expansion up to a maximum of 46 farms (or some other maximum), while ensuring that:

- Current guidelines on the dispersal of fish farms are maintained. However, there should be some flexibility to allow for the distribution of sites to be reorganized to optimize growing conditions and minimize environmental impacts.
- Fish farms are excluded from sensitive, unique or highly diverse water bodies.
- Fish farms are excluded from at least one of every major type of water body.
- Visual impact is minimized by requiring that buildings blend with the background.

Action 3.6 Carefully control the introduction of non-native species.

The introduction of any more Atlantic salmon should be reconsidered in light of international and national guidelines set out in A Wildlife Policy for Canada.

Action 3.7 Ensure high water quality for shellfish culture.

Protect existing shellfish farms from activities that may lower water quality, such as recreational and fishing boat anchorages, human settlements, fish farms, and logging. Additional sites for shellfish farms must be chosen with care, to avoid unacceptable competition with these activities. To prevent pollution, recreational and fishing boats should not be allowed to anchor closer than 125 metres from a shellfish farm.

Action 3.8 Develop a plan to expand local seafood processing.

There is some potential for expanding processing in Ahousat, Tofino, and Ucluelet. Constraints and opportunities should be a carefully assessed.

4. Tourism

Actions 4.2, 4.3 and 4.4 contribute to Goals 1 through 3 as they apply to tourism. Actions 4.5, 4.6, 4.7, 4.9 and 4.10 cover Goals 3 through 5. Action 4.1 helps to achieve Goals 4 and 5; and Action 4.8 covers Goal 4. Action 4.3 also contributes to Goal 6.

Action 4.1 Determine the nature and value of tourism in Alberni-Clayoquot.

Existing information on the nature and value of tourism is controversial and quite inadequate for development planning, investment, marketing, or protection of resources. A visitor survey should be done.

Action 4.2 Assess the carrying capacity of all tourism resources and ensure that tourism activities do not exceed this capacity.

Items of concern include campsites, beaches, Hot Springs, trails (particularly Meares Island), sport fishing, whale watching (being investigated by the University of Victoria), visitor pressure on other wildlife, and boat traffic.

Action 4.3 Assess the social carrying capacity of communities visited by tourists and ensure that tourism does not exceed this capacity.

This is partly a matter of making sure that tourism does not exceed the tolerance of most residents for the inconveniences caused by large numbers of visitors. Ways of doing this should be investigated.

Social carrying capacity is also a matter of ensuring that the tourism industry coexists equitably with other resource industries. To help in this, compatibilities between tourism and other industries should be identified and promoted as part of this Strategy.

Action 4.4 Reduce the focus on whales outside the migration season.

To avoid excessive emphasis on whales in the summer months, the forest, the diversity of the coast and of wildlife, and other attractions should be given more prominence.

Guidelines on whale watching should be reviewed.

Action 4.5 Develop interpretation facilities and improve guide services to enhance appreciation of coastal ecosystems, forest ecosystems, and sustainable uses of renewable resources.

Provide more informative leaflets, booklets, videos on these topics, and similar ways of educating tourists. Explore the possibility of providing training courses for local guides at the Port Alberni campus of North Island College.

Action 4.6 Adopt a sustainable tourism development plan for old-growth forests.

This should include forests in the Ucluelet area as well as within Clayoquot Sound, so that all old-growth forests that are available and suitable for tourism share the load. A system of trails should be designated. Some should be easy to use and able to support relatively large numbers of visitors. This means boardwalks. Others will be for hardy hikers and should be limited to small numbers of visitors. Interpretation should be provided for the trails. All trails should be monitored for visitor impact.

Action 4.7 Adopt a sustainable tourism development plan for cultural heritage.

A tourism development plan for cultural heritage should identify the most suitable cultural heritage themes and sites. It should also explore the potential for developing historic sites such as Cannery Bay, and heritage trails such as Willowbrae Trail. An inventory of historic buildings is needed as well.

Action 4.8 Protect the resource base of tourism.

Key areas for tourism will be identified by the Steering Committee through discussions with the industry and the public.

Action 4.9 Spread the benefits of tourism throughout Alberni-Clayoquot, and carefully control tourism development in Clayoquot Sound.

Economic benefits from tourism in Clayoquot Sound could be increased. One or more additional destination resorts would provide the biggest economic benefit. Small-scale products that may have most potential are boating and hiking. Ways of capturing more economic benefit from these products need to be explored.

The only ways of providing for growth are to expand accommodation or to promote more tourism in months other than July and August.

Action 4.10 Develop and promote a regional marketing strategy on the theme of sustainable living.

A "Sustainable Living Show" could be developed as a permanent centre in or near Port Alberni. This would be an attraction in its own right, with entertaining displays explaining the idea of sustainability, the ecosystems and communities of the region, sustainable uses of natural resources, and manufacture of products from sustainably-produced resources. It would also be a directory of demonstrations of sustainable living throughout the region: from parks and wildlife viewing to industry tours.

This could help to spread the benefits of tourism throughout the region; and it could extend the tourism season by promoting a wider range of attractions.

5. Mining

One action is proposed to cover Goals 1 through 6 as they apply to mining.

Action 5.1 Develop a plan to maintain a sustainable mining and exploration industry in Clayoquot Sound.

The purpose of the plan would be to ensure all other resource values and sectoral concerns in Clayoquot Sound are addressed in the review and approval of proposals for mineral exploration and mining developments. Since the review and approval processes already exist, the plan should focus on ensuring that all proposals are properly communicated to all interested parties so that their interests can be identified and addressed. The plan should be part of the Clayoquot Sound Sustainable Development Strategy.

Areas where special resource development guidelines are to be applied or areas proposed for protection from resource development should be identified. In sensitive areas, management guidelines should be recommended to protect and sustain the various resources and values of Clayoquot Sound. A full evaluation of all resource values, specifically including assessment of subsurface resources, should be undertaken prior to any final decisions on new protected areas.

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APPENDIX 1.
CARBON DIOXIDE AND OTHER "GREENHOUSE" GASES

"Greenhouse" gases get their name because they let sunlight pass through the atmosphere but trap heat that radiates back. Carbon dioxide is the most important greenhouse gas, followed by chlorofluorocarbons (CFCs), methane and nitrous oxide.

Except for CFCs, greenhouse gases are mainly produced by burning fossil fuels, clearing forests, and raising crops and livestock. Carbon is stored in oceans, forests, grasslands, soil, and fossil fuel deposits. When burned or otherwise oxidized, it is released in the form of carbon dioxide. If more is released than is stored, concentrations build up in the atmosphere.

Greenhouse gases are accumulating in the atmosphere, intensifying its heat-trapping properties. If present trends continue, and if current models of Earth's climate are correct, the average temperature of the planet is expected to increase by 1°C from 1990 to 2025 and by 3°C before the end of the next century[1].

This may not sound like much, but it is a faster change than has occurred naturally over the past 10,000 years. Climatic regions will shift; precipitation patterns will change; the sea level will rise; and violent storms could increase in frequency and intensity[1].

An international target has been proposed that all high-energy-consuming countries (such as Canada) should reduce their carbon dioxide emissions by at least 20% (from 1990 levels) by the year 2005[2]. Canada is committed to stabilizing carbon dioxide and other greenhouse gas emissions at 1990 levels by the year 2000[3].

This can be achieved by a variety of measures, chiefly reducing the burning of fossil fuels. Maintaining the carbon-storage capacity of old-growth forests could help, because old-growth forests store more carbon than younger forests. In the Pacific Northwest, on-site carbon-storage is greatly reduced by logging and does not approach old-growth storage for at least 200 years. Off-site carbon-storage can compensate for this to some extent: by using harvested trees for lumber and other long-lived wood products and by making sure that the products have a long lifespan[4]. Long rotations store more carbon than short rotations. And long-lived wood products store more carbon than short-lived ones. Some forest—whether, natural, modified or cultivated— stores much more carbon than no forest. The various options for reducing carbon dioxide concentrations need to be assessed to see which are the most cost-effective and socially fair.

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1. Intergovernmental Panel on Climate Change (1990a & 1990b).
2. IUCN/UNEP/WWF 1991.
3. Government of Canada 1990.
4. Harmon & others 1990.

APPENDIX 2.
FUNCTIONS AND BENEFITS OF PROTECTED AREAS

A system of protected areas (parks and reserves) is the core of any programme to maintain the diversity of ecosystems, species, and wild genetic resources; and to protect the world's great natural areas for their intrinsic, inspirational and recreational values.

A protected area system provides safeguards for:

- Natural and modified ecosystems that are essential to maintain life-support systems, conserve wild species and areas of particularly high species diversity, to protect intrinsic and inspirational values, and support scientific research.
- Culturally important landscapes of modified and cultivated ecosystems (including landscapes that demonstrate harmonious relationships between people and nature), and historic monuments and other heritage sites in built areas.
- Representative and unique examples of the world's natural and cultural heritage.
- Sustainable production of wild resources in modified ecosystems.
- Traditional, sustainable uses of natural and modified ecosystems, such as sacred places and traditional sites of harvesting by indigenous peoples.
- Recreational and educational uses of natural, modified and cultivated ecosystems.

Protected areas can be especially important for social and economic development when they:

- Conserve soil and water in zones that are highly erodible if the original vegetation is removed, notably the steep slopes of upper catchments and streamside zones.
- Regulate and purify water flow, notably by protecting wetlands and forests.
- Maintain important natural vegetation on soils of inherently low productivity that would yield little of value to human communities if transformed.
- Maintain wild genetic resources or species important in medicine.
- Protect species and populations that are highly sensitive to human disturbance.
- Provide habitat that is critical to harvested, migratory, rare or threatened species for breeding, feeding, or resting.

APPENDIX 3.
THE PLACE OF CLAYOQUOT SOUND AMONG THE ECOSYSTEM UNITS OF THE WORLD

Type of unit	Level of Importance	No. of units in BC	Name of Unit in which Clayquot Sound occurs	World extent of unit
Ecodomain	Global	4	Humid Temperate	Western & southern Canada & the lower 48 states of the USA, except the dry west
Ecodivision	Inter-national	7	Humid Maritime and Highlands	Coastal mountains & lowlands & continental shelf from Kodiak I., Alaska, to San Francisco Bay, California
Ecoprovince	National	10	Coast and Mountains	Rain forest & continental shelf from Kodiak I., Alaska, to southern Oregon
Ecoregion	Provincial	30	Western Vancouver Island	Mountains, lowlands & sounds of north & west Vancouver I. from Kelsey Bay to Jordan River
Ecosection	Local/ Regional	78	Windward Mountains	Island Mountains, lowlands & sounds of the western margin of Vancouver I. from Quatsino Sound to Jordan River

Ecosystems are a bit like Russian dolls, nesting within each other. The Ice Lake ecosystem is part of the Ice Creek ecosystem, which is part of the Shelter Inlet ecosystem, which is part of the Clayoquot Sound ecosystem. In turn, Clayoquot Sound is part of the Windward Island Mountains Ecosection, which is part of the Western Vancouver Island Ecoregion, and so on up the table.

Nature isn't quite as neat as this. Ecosystems overlap and can be classified in different ways. The classification here is used by the BC Ministry of Environment (Demarchi & others 1990) and fits in reasonably well with national and international classifications.

This table can be used to assess the importance of a habitat or other feature of Clayoquot Sound by relating it to the "level of importance" column. If it is significant in terms of the Western Vancouver Island Ecoregion, the feature is of provincial importance. If it is significant in terms of the Humid Maritime and Highlands Ecodivision, the feature is of international importance. And so on.

APPENDIX 4. BC PARKS' ASSESSMENT OF CLAYOQUOT SOUND IN RELATION TO ITS CONSERVATION AND RECREATION GOALS

Please note that this information is provided for the convenience of participants in the Strategy. It has not yet been reviewed by the Steering Committee.

BC Parks' assessment of Clayoquot Sound in relation to its recreation goals

RECREATION GOAL	STATUS OF GOAL IN CLAYOQUOT SOUND
1. Provide parks along major travel corridors.	Highway 4 Parksville - Tofino & Ucluelet. Existing provincial & national parks adequate.
2. Provide parks that are major outdoor recreation destinations.	Pacific Rim NP adequate.
3. Provide parks that give outstanding backcountry adventure recreation experiences across the province.	Clayoquot Sound considered to be 1 of 41 areas offering these experiences. Its key features are the rugged west coast island & river systems, & a backcountry destination area with boating, beaches & intertidal marine opportunities. Identified for further study: Pretty Girl Cove, Sulphur Passage, Vargas Island, Flores Island, Boat Basin, Megin River watershed, Ursus Creek watershed, lower Bedwell River.
4. Provide parks for regional recreation in areas where other agencies cannot.	Existing parks provide local recreation opportunities. Some expansion desirable. Identified for further study: Pretty Girl Cove, Boat Basin, Unnamed creek/ waterfall flowing into Millar Channel.

BC Parks' assessment of Clayoquot Sound in relation to its conservation goals

CONSERVATION GOAL	STATUS OF GOAL IN CLAYOQUOT SOUND
1. Protect examples of the most important representative natural landscapes of BC.	CS contains portions of 2 natural landscapes: West Coast Plain; & West Vancouver Island Mountains. West Coast Plain nearly adequately represented by Pacific Rim NP, Botanical Beach PP & Carmanah Pacific PP. Gaps: marine areas, mature forests, faunal habitat, & "eco-sustainability". West Vancouver Island Mountains partially represented by Strathcona PP & Brooks Peninsula RA. Gaps: marine areas (fiords, islands & channels), faunal habitat, rivers & spawning habitat, low elevation lakes, & karst features. Identified for further study: Megin River watershed, Ursus Creek watershed, lower Bedwell River.
2. Protect BC's key recreation settings & most outstanding scenic features.	Protected outstanding features & corridor features: Hotsprings Cove; Gibson; Long Beach. Unprotected outstanding features: Estevan Point lighthouse; Hesquiat Harbour (anchorage); Frank Island (tombolo); Clayoquot Plateau (caves). Unprotected outstanding corridor features: sheltered waters of Clayoquot Sound; marine shores/ beaches of Hesquiat Harbour, Flores Island & Vargas Island. Unprotected important feature: Kennedy Lake. Identified for further study: Sulphur Passage, Vargas Island, Flores Island, Boat Basin, Megin River watershed, Ursus Creek watershed, lower Bedwell River.

Ecological reserves

A systematic evaluation of the extent to which the variety of biogeoclimatic units and other ecosystems is represented in ecological reserves is under way. Gaps or inadequacies in the network of ecological reserves include: entire watersheds, fjords, valley bottom forests, yellow cedar forests, pure red cedar forests. Meanwhile, two new ecological reserves have been proposed: Clayoquot Plateau; and Hesquiat Lake.

APPENDIX 5. UNMODIFIED WATERSHEDS IN CLAYOQUOT SOUND

Unmodified means less than 2% of the area altered by logging, mining, roads, etc. Primary watersheds drain directly to the sea. Secondary watersheds drain into a primary watershed.

Unmodified[1] watersheds in Clayoquot Sound

	Number of unmodified watersheds (1st no.) & protected unmodified watersheds (2nd no.) in:			
	CLAYOQUOT SOUND	WESTERN VANCOUVER I	ALL VANCOUVER I	COASTAL BC
Primary watersheds				
1,000-4,999 ha	6/0	18/1	21/1	Not known
Watta Creek Cecilia Creek Ice River Unnamed creek, Flores Cow Creek, Flores Unnamed creek, Flores				
5,000-9,999 ha	1/0	5/0	6/0	}
Sydney River				} 98/9
10,000-19,999 ha	1/1	1/1	1/1	}
Moyeha River				
20,000 ha or more	1/0	1/0	1/0	20/1
Megin River				
TOTAL	9/1	25/2	29/2	118/10
Secondary watersheds				
1,000-4,999 ha	1/0	5/0	9/2	
Satchie Creek				
5,000-9,999 ha	2/0	3/1	5/3	
Clayoquot River Ursus Creek				

Unmodified watersheds in Clayoquot Sound (continued)

	Number of unmodified watersheds (1st no.) & protected unmodified watersheds (2nd no.) in: CLAYOQUOT SOUND	WESTERN VANCOUVER I	ALL VANCOUVER I	COASTAL BC
Secondary watersheds				
10,000-19,999 ha	0	0	1/1	
20,000 ha or more	0	0	0	
TOTAL	3/0	8/1	15/6	

Sources: Moore (1991); Wilkinson (1990).

Areas of unmodified watersheds in Clayoquot Sound

Areas of watersheds according to BC Ministry of Forests Recreation Branch (1991), Hall & McLellan (1990), Moore (1991), and Wilkinson (1990):

	MoF Recreation	Hall & McLellan	Moore	Wilkinson
Bulson Creek	10,200	10,205	7,287	--
Cecilia Creek	--	--	--	1,573
Clayoquot River	8,200	8,175	--	6,998
Ice River	--	--	--	3,427
Megin River	25,400	25,446	24,299	21,713
Moyeha River	18,200	18,190	18,220	16,885
Satchie Creek	--	--	--	1,850
Sydney River	6,100	6,149	5,885	5,299
Ursus Creek	--	9,411	--	6,567
Watta Creek	--	--	--	3,467
Cow Creek, Flores	--	--	--	1,369
Unnamed, Flores	--	--	--	1,530
Unnamed, Flores	--	--	--	3,100

The maps of Bulson Creek and Ursus Creek in Hall & McLellan (1990) include areas outside the watersheds and so lead to inflated estimates of their size. The estimates of Moore (1991) and Wilkinson (1990) are likely to be more accurate. Hall & McLellan include Bulson Creek in their list of "unlogged" or "undeveloped" watersheds. But Moore, Wilkinson, and this document exclude it because 160 ha (2.2% of the watershed area) have been logged.

APPENDIX 6. ESTIMATING THE SIZE OF THE PRODUCTIVE FOREST LAND BASE IN CLAYOQUOT SOUND

"Productive forest land" is land that is available for growing an economic crop of timber. It does not include land that is in parks or other protected areas, "environmentally sensitive areas" where logging is excluded, inaccessible or inoperable areas, or areas where it is not considered economic to log at the present time.

Sterling Wood (Timber study) calculated the productive forest land base to be 149,096 hectares. This figure is reached by deducting certain areas from the total forest landbase, a process known as netting down. The Timber study applied the netting down procedure used by the Ministry of Forests for the Arrowsmith Timber Supply Area (of which Clayoquot Sound is a part)[1]. This deducts:

5% of the forest area to allow for environmentally sensitive areas (ESAs). ESAs are areas required to protect fisheries, water, or soil; to prevent snow avalanches; or for recreation. They include leave strips along streams, lakes, and the shoreline.

All low quality sites. Forest land is classified for growth capacity into good, medium, poor and low quality sites. Low sites are not counted in the productive land base because they do not produce merchantable stands of timber. In Clayoquot Sound the areas are[2]:

Good	3,000 hectares
Medium	36,000 hectares
Poor	95,000 hectares
Low	46,000 hectares

Non-commercial forest types as follows;

All yew and deciduous types (such as alder).

All lodgepole pine types with very small stems (stocking class 4).

75% of the area of all hemlock and balsam types older than 140 years on poor sites (breast height at age 50 site index between 10 and 20).

25% of the area of all cedar types older than 140 years on poor sites (breast height at age 50 site index

1. Timber study: 24-26 & Appendix III.
2. BC Ministry of Forests, Inventory Branch, GIS Applications Group 1991.

between 10 and 20).

8% of the forest area in the first decade and 5% thereafter to allow for roads, quarries, gravel pits, etc.

All inoperable forest types. These include stands that are too difficult to log or cannot be reached.

The Timber study followed this procedure except for the last item, due to lack of information on inoperable stands. Since some forest types will be inoperable, the productive forest land base must be less that 146,000 hectares. If not enough land has been deducted to allow for environmentally sensitive areas or for roads, then the amount of productive forest will be smaller still.

APPENDIX 7. ESTIMATES OF THE VALUE OF TOURISM IN ALBERNI-CLAYOQUOT AND CLAYOQUOT SOUND

Estimates of the number of tourists who visit the Alberni-Clayoquot Regional District range from 1.23 million a year (in 1989) to 306,340 a year (see Box A1). The available statistics are not very reliable; but the least unreliable figure comes from the special run of Vancouver Island/Coast region data from Visitor '89 (see Box A2).

This covers only visitors to the region who are not residents of BC: an estimated 197,860 persons. According to the Vancouver Island Tourism Monitor, non-resident visitors account for about half of the total visitors to the Vancouver Island/Coast region. This is born out by a survey of visitors to the Long Beach Unit of Pacific Rim National Park, which shows that 55% of visitors are BC residents (see Box A3). If this proportion is true for all of Alberni-Clayoquot, then the total number of visitors to the regional district in 1989 was about 435,292 (197,860 x 2.2).

This cannot be reconciled with the total number of visitor trips to the Long Beach Unit of Pacific Rim National Park, which was 599,442 after deducting an estimate of local traffic. However, the actual number of visitors to the Long Beach Unit is lower than this figure, because repeat visits are not deducted (see Box A4).

How many people visit Tofino and Clayoquot Sound? There are two estimates. Careless (1988) estimated that 530,000 people visited Tofino/Clayoquot Sound in 1988, based on the number of visitor trips to the Long Beach Unit of Pacific Rim (563,193). The Tourism study thought that this was too high, since one visitor could re-enter the Park several times. It therefore treated visitor trips as equivalent to visitor/nights rather than to actual visitors.

The Tourism study estimated that 222,230 people visited Tofino/ Clayoquot Sound in 1990 for a total of 600,020 visitor/nights. The estimate is based on a review of accommodation capacity and occupancy rates in Tofino, together with unverified assumptions that of visitors to Tofino/Clayoquot Sound 83% stay in Tofino, 12% stay in Ucluelet, and 4% stay in Alberni Valley.

Estimates of average daily expenditure per visitor range widely--from $26.92 to $62.62 (Box A5). The most reliable estimate would be based on a diary of expenditures by visitors (Tourism study; Novacorp 1990). It would cover both non-BC resident and BC-resident visitors excluding Alberni-Clayoquot residents (Careless 1988). And it would cover only visitors to Alberni-Clayoquot or Clayoquot Sound (Tourism study; Canadian Parks Service 1991; Careless 1988). None of the estimates meets all three of these criteria.

Given the wide ranges in numbers of visitors and visitor expenditures, it is not surprising that estimates of total expenditures vary widely: from $14 million to $38 million in Clayoquot Sound; and from $52 million to $177 million in Alberni-Clayoquot (see Box A6). The actual amounts are probably somewhere in between.

Growth rates can be surmised from data on tourist traffic and room rental expenditures. Tourist traffic to the Long Beach Unit of Pacific Rim National Park reached a peak of 179,905 vehicles in 1984 and then dropped to 156,901 vehicles in 1985. Numbers did not return to the 1984 level until 1988 when they reached 187,730. In 1990 there were 209,256 vehicles, a growth rate of 11% (5.7% per year) since 1988.

Room rental expenditures in Alberni-Clayoquot rose by an average of 16% a year between 1985 and 1989 (see Box A7).

Box A1. Estimates of tourist (non-business) visitors to Alberni-Clayoquot in 1989

Source	Estimate
Novacorp (1990) (based on existing survey data)	1.23 million tourists and 3.83 million tourist/nights at average length of stay of 3.1 nights
Novacorp (1990) (based on accommodation research)	887,000 tourists and 2.75 million tourist/nights at average length of stay of 3.1 nights
Vancouver Island/Coast Tourism Task Force (based on existing survey data) x 2.2 (see main text)	435,292 visitors (includes business visitors) and 1.195 million visitor/nights at average length of stay of 3.02 nights
Tourism study (based on estimates of occupancy rates)	306,340-613,200 tourists and 827,110-1.66 million tourist/nights at average length of stay of 2.7 nights

Box A2. Profile of non-BC-resident visitors to Alberni-Clayoquot, 1989

Visitor parties: 76,100
Party size: 2.6
Number of visitors (76,100 x 2.6): 197,860
Average length of stay*: 3.02 nights
Number of visitor/nights (197,860 x 3.02): 597,537

Season: July-August 44%; September-November 28%; April-June 25%; December-March 3%

Party composition: adults only 82%; adults with children 18%
Origin of party: Canada 48%; USA 29%; other international 22%
Sex*: female 59%; male 41%
Age*: 15-18 1%, 19-24 7%; 25-34 17%; 35-44 21%; 45-54 20%; 55-64 22%; 65+ 12%
Income*: under $20,000 13%; $20-39,000 34%; $40-59,000 26%; $60,000+ 27%

Accommodation (party nights): hotel/motel/resort 55%; camp 27%; friends/relatives 10%; bed & breakfast 2%

Main purpose of trip: touring 48%; visiting friends/relatives 20%; outdoors trip 18%; business/conference 6%; personal 6%; city trip 2%

Per person daily expenditures:

accommodation	$17.55
auto transportation	$ 7.97
other transportation	$ 1.98
package tours/cruises	$ 3.28
restaurants	$10.99
groceries/beverages	$ 3.15
recreation	$ 6.82
entertainment	$ 3.09
shopping/souvenirs	$ 4.30
other	$ 1.67
TOTAL	$62.62 but the above adds up to $60.80

* data for Vancouver Island except Capital Regional District; no specific data for Alberni-Clayoquot

Source: special run of Visitor '89 for the Vancouver Island/Coast region, summarized in Vancouver Island/Coast Tourism Task Force 1991

Box A3. Profile of visitors to the Long Beach Unit of Pacific Rim National Park, 1989

Visitor parties: 199,814
Party size: 2.8
Number of visitors (199,814 x 3.0): 599,442
Percentage of local visitors: 7%
Percentage of non-local day-trippers: 10%
Average length of stay of the other 83%: 3.4 nights
Average length of stay of all non-local visitors: 3.0 nights

Party composition: adults only 67%; adults with children 27%
Origin of party: Alberni-Clayoquot 7%; other BC 48%; other Canada 23%; USA 11%; other international 12%
Sex: female 51%; male 46%

	Stayed last night	Staying tonight
At home	15%	21%
Elsewhere	84%	79%
Tofino/Ucluelet	56%	51%
Other Alberni-Clayoquot	9%	9%
Other Vancouver I.	17%	16%
Other BC	5%	5%
Outside BC	1%	1%
Not applicable/no answer/ error in data entry	13%	18%
Hotel/motel	40%	35%
Family/friend's house	8%	9%
Campground	30%	30%
Bed & breakfast	4%	3%
Boat	0%	1%
Other	7%	11%
Not applicable	10%	12%

Main purpose of trip: pleasure trip 56%; outdoor recreation 15%; visiting friends/relatives 11%; business trip 5%

Per person daily expenditures: $35.00

Sources: Canadian Parks Service 1991
Canadian Parks Service unpublished data

Box A4. How the Canadian Parks Service estimates the number of visitors to the Long Beach Unit of Pacific Rim National Park

Vehicles entering the Park going north towards Tofino are counted by a tire counter across the road. Vehicles leaving the Park or entering it from Tofino are not counted (which is fine because their entry has already been recorded).

5,000 vehicles per month are assumed to be local traffic--local people going back and forth between Tofino and Ucluelet and Alberni valley--based on preliminary studies conducted by the Canadian Parks Service. The rest are counted as visitors.

Visitors who stay in the Park or in Tofino are counted only once unless they go on an excursion to Ucluelet or anywhere that would cause them to re-enter the Park from the south.

Visitors who stay in Ucluelet or Alberni valley are counted every time they enter the Park.

A proportion of visitors will therefore be counted more than once. No allowance is made for this.

The average party size (number of visitors per vehicle) is 2.8, based on a 1989 survey of visitors to the Long Beach Unit.

Conclusion: the Parks Service estimate overstates the number of visitors to the Long Beach Unit to the extent that it does not take account of repeat visits. A traffic partition study is planned for 1992, which will establish a more accurate figure.

Box A5. Estimates of average daily expenditure per visitor used to calculate total (BC-resident and non-BC-resident) tourist expenditures

Study	Estimate	Source of estimate
Tourism study	$62.62 spent by non-BC-resident visitors to Alberni-Clayoquot in 1989	Visitor '89 special run for Vancouver I./Coast
Novacorp (1990)	$46.00[1] spent by non-BC-resident visitors to Vancouver Island in 1989	Visitor '89
Canadian Parks Service (1991)	$35.00 spent by all visitors to Long Beach Unit, Pacific Rim NP, in 1989	Survey of visitors[2]
Careless (1988)	$26.92 spent by all visitors to Tofino/Clayoquot Sound in 1988	Survey of operators

Notes:

1. This sum is incorrect. The amount given in Visitor '89 is $46.25 and the expenditure items add up to $48.14.

2. Includes local visitors (residents of Alberni-Clayoquot) and predictions of how much the visitor expected to spend.

Box A6. Estimates of the value of tourism in Alberni-Clayoquot and Clayoquot Sound

	Novacorp	Tourism study		Careless
	Alberni-Clayoquot 1989	Alberni-Clayoquot 1990	Clayoquot Sound 1990	Tofino/ Clayoquot 1988
Number of tourist/nights	3.83 million	827,110[1]	600,020[1]	530,110[1]
Daily expenditure per visitor	$46.00	$62.62	$62.62	$26.92
Overnight tourist expenditures	$176,320,000			
Day excursion tourist expenditures	$ 530,000			
Total tourist expenditures	$176,850,000	$51,793,630[1]	$37,573,250[1]	$14,268,180[1]
Vacation home owner spending	$ 1,290,000			
BC Parks spending	$ 250,000			
Parks Canada spending	$ 2,692,000			
Total other related expenditures	$ 4,232,000			
Gross economic value	$181,082,000			
Direct wages/salaries[5]	$ 52,090,000[2]	$21,800,000[2]	$15,100,000[3]	
Indirect wages/salaries[5]	$ 18,880,000[2]	$17,700,000[2]	$12,200,000[3]	
Total wages/salaries[5]	$ 70,970,000[2]	$39,500,000[2]	$27,300,000[3]	
Direct employment[6]	2,736[2]	1,140[2]	788[3]	249[4]
Indirect & induced employment	821[2]	596[2]	412[3]	122[4]
Total employment[6]	3,557[2]	1,736[2]	1,200[3]	371[4]

Notes: 1. Rounded to the nearest 10.
2. Contribution of tourism in Alberni-Clayoquot to employment in Alberni-Clayoquot.
3. Contribution of tourism in Clayoquot Sound to employment in Alberni-Clayoquot.
4. Contribution of tourism in Clayoquot Sound to employment in Tofino.
5. Before tax.
6. Person-years.

Sources: Novacorp (1990); Tourism background study; Careless (1988)

Box A7. Room rental expenditures[1] in Alberni-Clayoquot

	Alberni-Clayoquot millions	A	Vancouver Island/Coast millions	B	British Columbia millions	C
1985	$4.43		$ 81.6	5.4%	$416.0	1.1
1986	$5.09	15%	$ 94.4	5.4%	$605.7	0.8
1987	$5.73	13%	$ 98.1	5.8%	$513.8	1.1
1988	$6.92	21%	$116.5	5.9%	$599.3	1.1
1989	$7.92	14%	$147.9	5.3%	$674.8	1.2

Note: 1. Any establishment with four or more rooms for rent such as hotels, motels, lodges, fishing camps, guest ranches, etc., but excluding campgrounds.

Column A = % increase over previous year
Column B = Alberni-Clayoquot as % of Vancouver Island
Column C = Alberni-Clayoquot as % of British Columbia

Source: Ministry of Finance and Corporate Relations, Planning and Statistics Division, from provincial hotel/motel room tax.

APPENDIX 8.

Steve Lawson, Jim Darling
Environment Representatives
Clayoquot Sound Sustainable Development Steering Committee
Box 384
Tofino, B.C., VOR 2ZO

VIA FACSIMILE: 387-5669

May 21, 1991

MINISTRY OF ENVIRONMENT
RECEIVED
MAY 21 1991
ASSISTANT DEPUTY MINISTER

Mr. Jim Walker
Chairman
Clayoquot Sound Sustainable Development Strategy-
Suite 229, 560 Johnson Street,
Victoria, B.C. V8W 3C6

Dear Mr. Walker:

RE: Resignation from the Clayoquot Sound Steering Committee

On May 15th we met with representatives from the Friends of Clayoquot Sound, Port Alberni Environmental Coalition, Friends of Strathcona, Western Canada Wilderness Committee, and the Sierra Club to discuss our ongoing participation on the Clayoquot Sound Sustainable Development Steering Committee. After a full review of the events surrounding the initiative, all agreed we should withdraw from this process. We have taken that advice and confirm our resignations effective immediately.

Our withdrawal is primarily the result of the decisions of the Interim Conservation and Development Panel. Through that forum the government confirmed that it has no serious commitment to conservation and sustainable development in Clayoquot Sound. The priority placed by government and industry on the protection of fibre supply at the expense of the environment and, for that matter long term forest employment, has compromised the Clayoquot Sound strategy development process.

The fact is that only a handful of watersheds on the west coast of Vancouver Island remain un-logged. Yet, it seems we cannot protect the remaining intact forest in Clayoquot Sound even for the duration of the planning process. This is pathetic, and inexplicable if there is a real commitment to this process by the government.

For more than a decade the residents of Clayoquot Sound have sought to protect the natural environment that supports them. Legal challenges have been made, local organizations and councils have lobbied in good faith for meaningful change, and communities have committed incalculable time and energy to a myriad of land

use planning processes - all to no avail. Destructive logging practices continue at the same rate and not an acre of forest has been permanently protected. There is enormous frustration building with the realization that no matter what process is undertaken, no significant change occurs.

The decision to continue clear-cutting the intact forest of the study area, during a process based on principles which include "conserving the diversity of nature" and "ensuring that all uses of renewable resources are sustainable" confirms the current planning process can be no different than the rest.

When appointed to the Steering Committee we accepted the responsibility of representing environmental concerns. However, we are prevented from doing so by a process driven by industry priorities (notwithstanding all the rhetoric to the contrary). It would be misleading and irresponsible for us to lend credence to the public perception that participation in the strategy development process by environmental representatives ensures that environmental and conservation concerns are being addressed. They are not.

We are allowing an environmental and economic disaster to occur in the forests of B.C. Government and industry seem determined to use all of their power and resources to maintain the status quo, while buying time sitting on round tables, task forces and steering committees. The environment, wildlife, and natural resource dependent communities are the losers. Our continued participation would condone this government sponsored inaction.

Respectfully yours,

Steve Lawson
Environment Representative

Jim Darling
Alternate

cc Robert Prescott-Allen
Strategy Director
Clayoquot Sound Sustainable Development Steering Committee
Suite 229, 560 Johnson Street
Victoria, B.C.
Facsimile: 474 6976

CLAYOQUOT SOUND SUSTAINABLE DEVELOPMENT STRATEGY

STEERING COMMITTEE
Representatives and Alternates

REPRESENTING	REPRESENTATIVE and ALTERNATE	PHONE	FAX
Chairperson	Jim Walker	356-0139	387-5669
Communities			
Nuu-chah-nulth Tribal Council	George Watts	724-5757	723-0463
City of Port Alberni	Gillian Trumper	723-2146	723-1003
	Alt. Henry Nedergard	724-0171	724-2800
District of Tofino	Jack Gillie	725-3797	725 3775
	Alt. Maureen Fraser	725-3915	725-3775
Village of Ucluelet	Bill Irving	726-7744	726-7335
	Alt. Clive Pemberton	726-4213	N/A
Regional District of Alberni-Clayoquot	Hans Irg	723-2401	723-1327
	Alt. Audrey O'Dell	726-7125	726-7335
Interest groups			
Aquaculture	Ian Bruce	725-3112	725-3112
	Alt. Mike Davis	725-3131	725-3750
Fishing	John Fraser	725-3774	725-2111
Labour	Dave Haggard	724-0171	724-2800
	Alt. Ken McRae	723-3931	723-3611
Mining	Ken Sumanik	681-4321	681-5305
	Alt. Jack Patterson	681-5328	681-2363
Small Business	Whitey Bernard	725-3251	725-2111
	Alt. Donna Fraser	725-4229	725-2111
Timber			
(Interfor)	Dean Wanless	681-3221	681-2924
(MacMillan Bloedel Ltd.)	Don Dowling	724-7821	724-7826
	Alt. Joe Duckworth	724-7823	725-7826

STEERING COMMITTEE
Representatives and Alternates (Continued)

REPRESENTING	REPRESENTATIVE and ALTERNATE	PHONE	FAX
Timber-Small Business	Jim McBride	725-3714	N/A
Tourism	Joan Dublanko	725-3726	725-3775
	Alt. Rod Buhtz	725-3274	N/A
Government			
Ministry of Agriculture, Fisheries and Food	Michael Coon	387-9684	356-7280
	Alt. Joe Truscott	387-9570	356-7280
Ministry of Energy, Mines and Petroleum Resources	Graeme McLaren	356-2289	387-5713
	Alt. Tom Greene	356-9623	387-5985
Ministry of Environment, Lands and Parks	Mike Whately (environment)	758-3951	755-2473
	Alt. Earl Warnock	758-3951	755-2473
	Jake Masselink (parks)	387-9997	356-1899
	Alt. Ron Lampard	755-2483	248-8584
Ministry of Economic Development, Small Business and Trade	Jim Cameron	755-2206	755 2222
	Alt. Lisa Gow	387-1232	387-4410
Ministry of Tourism and Culture	Stuart Gale	356-9600	387-1420
	Alt. Alex Grizybowski	356-1474	387-1590
Department of Fisheries and Oceans	John Greenlee	723-4524	724-2555
	Alt. Laurie Gordon	723-4524	724-2555
Canada Parks Service (observer)	Howie Hambleton	726-7721	726-7100
Ministry of Forests	Paul Paetznik	724-9205	724-9061
	Alt. Chris Haylmurst		